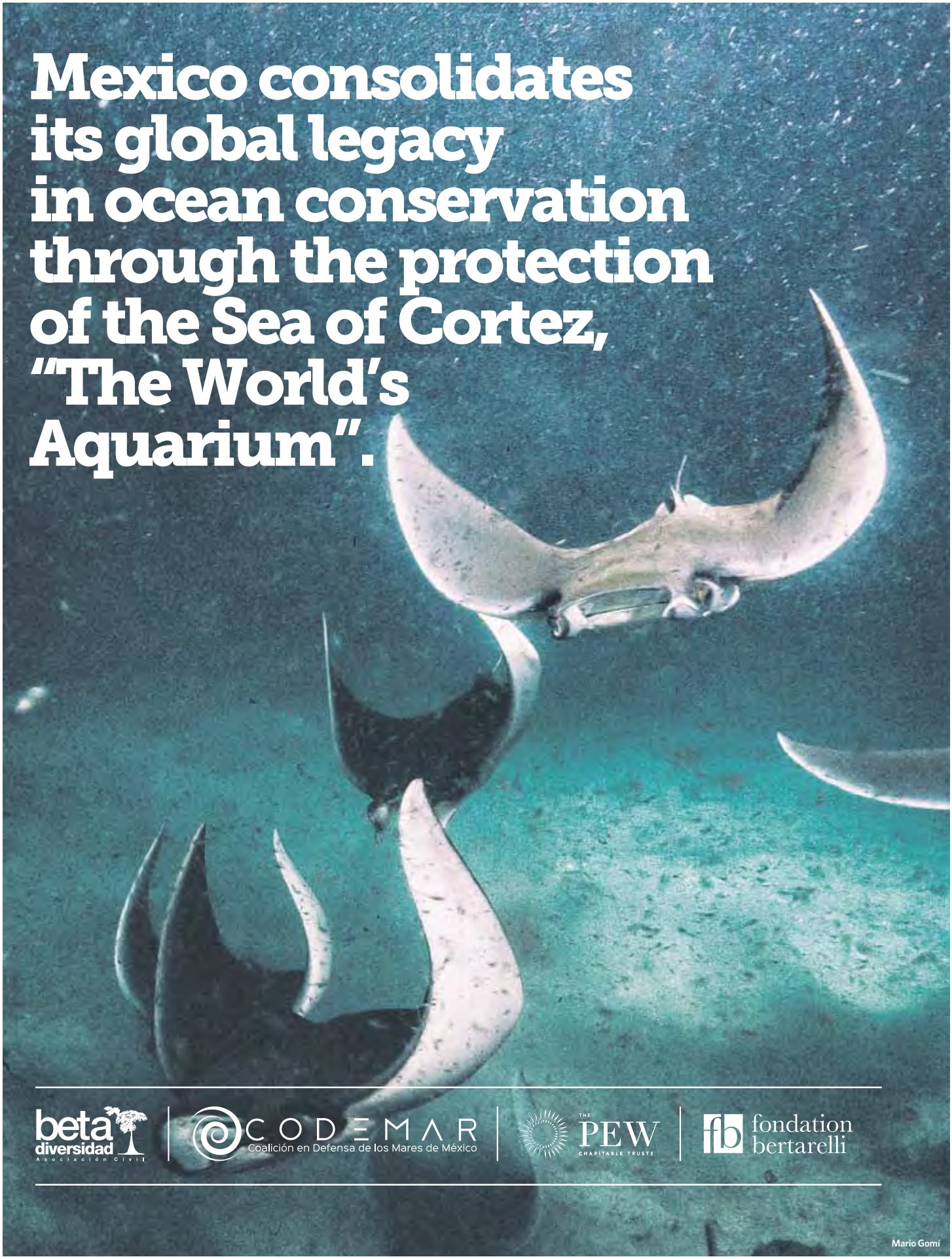
Equilibrio

OCTOBER 2018

MEDIO AMBIENTE + RESPONSABILIDAD SOCIAL

Sea of Cortez
Photo: Jorge Cervera Hauser


Mexico consolidates its global legacy in ocean conservation through the protection of the Sea of Cortez, "The World's Aquarium".
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CODEMAR
Coalición en Defensa de los Mares de México
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fondation bertarelli
Mario Gomí

We are ocean

We are in debt with the Mexican seas and the planet's oceans: thanks to them we have witnessed endless natural spectacles that occupy our memories, they provide millions of jobs worldwide and put food on the tables of families from the five continents. We are ocean and we belong to the oceans.

However, more than ever, our oceans are endangered because of the effects of various threats. It is fair to say that probably the most devasting one is fishing overexploitation, which has driven several marine species to extinction and compromises the very existence of thousands of traditional fishing communities, which depend on healthy, full of life ecosystems to survive.

Mexico is not exempt from suffering the consequences of fishing overexploitation, particularly at the Sea of Cortez and the South Californian Pacific, where historically the fishing industry has exploited senselessly what was once called the "Aquarium of the World". If us, Mexicans, do not take extreme and immediate measures, it is possible there will be no turning back.

Because of this, those of us who are part of the Coalition for the Defense of the Seas in Mexico (CODEMAR), propose the creation of a great Biosphere Reserve in the waters surrounding Baja California Sur, as we are convinced that only a measure of this magnitude would, in the long run, benefit traditional fishermen in the area, encourage conservation tourism and, of course, allow the recovery of the populations of species that have been decimated.

This edition of *Equilibrio* showcases a panoramic view of the current status at the Sea of Cortez and the South Californian Pacific, with the purpose of pinpointing the reasons why it is imperative to declare the area as a Biosphere Reserve.

Through these pages, you will find analysis, features and opinion articles by recognized national and international experts who, with objective and conclusive arguments, analyze the huge advantages of protecting at perpetuity one of the richest seas in the planet.

Besides reinforcing our commitment to seas of our country, we would like to take the opportunity to thank all those who have supported us: scientists, academics, service providers, private initiative representatives, members of the civil society and media. We would also like to thank the Environment and Natural Resources Department (SEMARNAT) and the Commission for Natural Protected Areas (CONANP). Finally, we would like to make a special mention and express our most heartfelt gratitude to the Pew Bertarelli Ocean Legacy Project.

The Sea of Cortez and the South Californian Pacific belongs to all of us, Mexicans!

The editors

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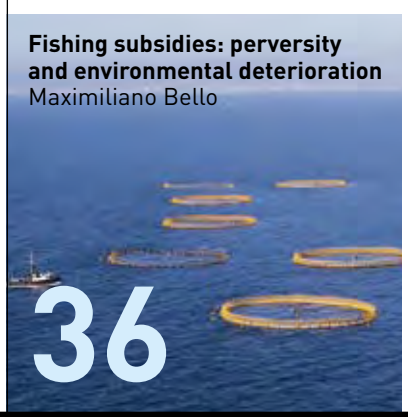
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Sea of Cortez and South Californian Pacific

SOURCE OF SUSTENANCE, ENJOYMENT AND RESEARCH

What portions of the oceanic surface are really protected?

By Johnny Briggs I @johnnyrbriggs
Project Legacy for the Oceans by Pew Bertarelli

The Revillagigedo National Park, in the Pacific Ocean, is the largest protected marine area with a fishing ban in North America, with an area of 14.8 million hectares. Its creation is quite an achievement for Mexico. Photo: Janos Rautonen.

Despite the progress made, the international community must do more to drive further the conservation efforts for the world's oceans.

Our planet is home to a wonderful diversity of natural habits which host all kids of life. However, many of these habitats —and the species that depend on them— are at risk. To protect them efficiently, a generalized and multinational effort is required, hence, international organizations, such as the United Nations, have established specific conservation targets.

Although governments worldwide have protected vast land extensions, it is taking them longer to do the same for the ocean. There are two fundamental targets for the defense of the seas —The United Nations Objective 14 for Sustainable Development and Goal 11 from the Aichi Convention on Biological Diversity— both seek to protect efficiently at least 10% of the ocean by 2020. Having said that, how close are we really to achieving this target? The answer is not so clear.

According to the UN World Database on Protected Areas, which holds the records countries send on Protected Marine Areas (PMA), 15 600 PMA safeguard over 25 million square kilo-

meters (9.7 million square miles) of oceans. In other words, almost 7% of the oceans, which is equivalent to an area the size of North America, is under some sort of protection..

But, are these figures accurate? How well protected are these areas? The concept of Protected Marine Area has turned into a multipurpose terminology which encompasses various ocean management methodologies that mean different things to different people.

The classification system developed by the IUCN (International Union for the Conservation of Nature) is the most widely used and, it is also the most permissive one as it allows a wide range of activities in areas classified as PMA. So, there are areas which only allow for indigenous groups to make sustainable use of the resources and there are other zones where mining and industrial fishing have been allowed within the PMA, despite the fact that these activities do not comply with the IUCN normativity.

A more realistic assessment of the world panorama, developed by the Marine Conservation Institute as part of their Atlas of Marine Protection, shows that only 3.66% of the ocean is managed as real Protected Marine Areas.

The difference between figures is probably due to the interpretation of the IUCN of what constitutes a PMA and also to the lack of accuracy in the information sent to the Protected Marine Areas World Database: both issues indicate that the Atlas of Marine Protection is probably more realistic. As a matter of fact, several colleagues and myself, together with expert coauthors, came to the same conclusion when we analyzed the differences between the two figures. We presented these findings in the article "Recommendations to the IUCN to improve classification and reporting on Protected Marine Areas".

In the above-mentioned document, we evaluate the world targets and the definitions of a PMA, we reflect on the developments and make important recommendations to improve the IUCN categorization criteria for a PMA and strengthen the currently used framework. We argue that the latter, plus reporting standards, is essential to understand, evaluate and communicate efficiently the ecological benefits of PMA.

Furthermore, based on various other studies, we support our claim that highly Protected Marine Areas are the best for the ocean´s health and are the most efficient means to achieve the conservation objectives set by the international community.

The year 2020 is around the corner, therefore governments must hurry to create vast, highly protected PMAs. The best news for the species —ours included— that depend on healthy oceans would be that the 10% target of PMAs has been met, and with the right normativity in place.

Protected marine areas: conservation and sustainable fishing

By Gabriel Quadri I @g_quadri

The Mexican marine territory —which includes the territorial seas and the Exclusive Economic Zone— has a surface 1.5 times larger than its land territory. This marine territory has been severely exploited in the light of institutional weaknesses, state governments who have advocated for the interest of private fishing companies, illegality, unregulated or unreported fishing activity, limited surveillance and, up until November 2017, the utter lack of Protected Marine Areas with fishing bans. As a result of the latter, many fisheries have been deteriorated, numerous ecosystems depleted and populations of various charismatic marine species decimated and taken to the verge of either commercial or biological extinction.

Science and experience in different countries have coincided in the need to establish vast protected marine areas with a total fishing ban or at least a partial one, banning industrial or non-selective fishing as the main mechanisms for the recovery of the oceans and the fisheries themselves. In this sense, Mexico has committed to the Aichi

agreements from the UN Convention on Biological Diversity, which obligate us to protect —at least— 10% of the national marine surface by 2020. On the other hand, science considers imperative the protection of 30% of the planet's oceanic surface, beyond the Aichi goals, with the aim of ensuring the integrity of the ecosystems, the survival of the species and the recovery of today's overexploited fisheries.

These challenges, however, present themselves to our country in a context of grave institutional limitations. Meager government budgets for conservation stand out. The National Commission for Natural Protected Areas (Comisión Nacional de Áreas Naturales Protegidas CONANP) receives an annual budget of roughly 50 million dollars (only 2% of the total budget for the Environment and Natural Resources Department), which is clearly insufficient to allow even the basic conditions for the operation of the Natural Protected Areas, let alone the Marine Natural Protected Areas, which receive a very small portion of the total. This implies great restrictions for the work of institutions in terms of conservation and reflects the low priority status the society and the government have given to this issue.

Also worrying are the surveillance and law enforcement capabilities of both the Federal Agency for the Protection of the Environment (Procuraduría Federal de Protección al Ambiente PROFEPA) and the Marine Department (Secretaría de Marina-Armada). All this despite the creation in 2017 of the Coast Guard under the command of the Coalition for the Defense of the Seas (Coalición en Defensa de los Mares de México CODEMAR), with full surveillance and law enforcement capabilities.

The fact of the matter is that nearly 50% of the fishing activity in Mexico because it is done without the proper permissions, often in violation of the closed season, using fishing arts which are no longer permitted and capturing very young specimens or in areas with a ban.

TO WHOM DO SEAS IN MEXICO BELONG TO?

The underlying issue regarding the sustainable management of the Mexican seas is the existing void in both vision and perspective. To whom do seas in Mexico belong to? Who has the right to value them and guide their destiny? Up until now, despite the fact that according to the Constitution 17th Article, they belong to the Nation, it appears to be that fishing companies possess exclusive rights for their use and abuse.

Virtually all of the territorial sea is exploited with almost no restrictions. Fisheries decay, species disappear and entire marine ecosystems are affected, even

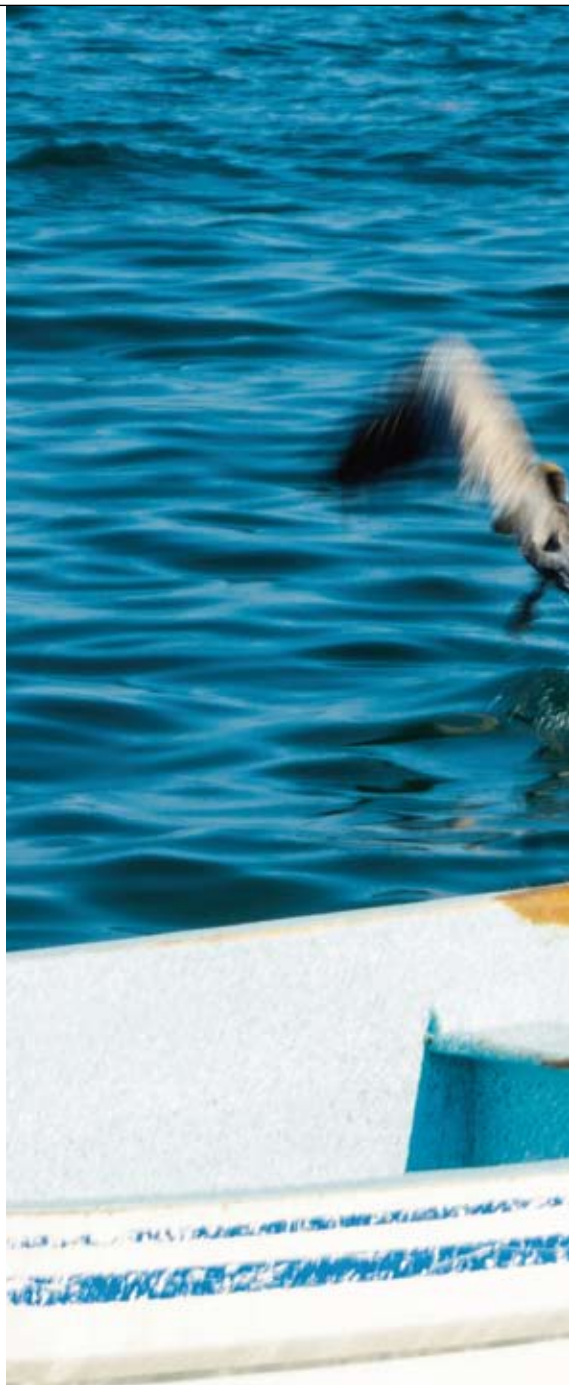
against the sustainability of the industry. Almost all the players within the fishing industry assume that the seas and their resources are their *property*. It is with great difficulty that they admit other players or stakeholders to take part, even if it is about the public interest; for example, conservation efforts, sustainable use, observation tourism and enjoyment —non-consumptive— of species or marine ecosystems.

The power of fishing interests is ubiquitous throughout all the national seas. Let us remember how the majority of the Exclusion Zone in Campeche, where strategic facilities of the Mexican oil industry are located, has just recently been opened for fishing activity, regardless of the obvious risks and implications for national security and the integrity of the oil extracting facilities. Also, despite the fact that this means depleting an ecologic and fishing savings account in the Gulf of Mexico.

The power of the fishing industry was also made clear when they rejected the initiative for the General Law on Biodiversity (Ley General de Biodiversidad) which intended to grant SEMARNAT authority in terms of declaring closed seasons for the exploitation of marine species.

Another example of the extent of the power of the fishing industry is the number of subsidies they receive on behalf of the National Commission for of Aquaculture and Fishing (Comisión Nacional de Acuacultura y Pesca CONAPESCA) which account for 70% of their budget, including subsidies for fuel (marine diesel and gasoline), engines, small vessels and equipment for larger vessels.

The absolute surrender of the oceans to fishing exploitation is not written anywhere, it is a consequence of the historic, institutional and cultural disregard towards our marine territory and the political overrepresentation of the sector's stakeholders. The latter despite the fact that fishing accounts for an insignificant 0.1% of the national GDP and, in terms of employment, it accounts for just 0.34% of the economically active population.



THE TRAGEDY AND HOW TO OVERCOME IT

The Mexican context, virtually with unrestrictive access to almost all the national marine territory and the Exclusive Economic Zone, is what is known as the Tragedy of the Commons. Exploit the most in the least possible time is the predominant logic which, propelled by the subsidies from CONAPESCA, has driven 85% of the national fisheries to a state of deterioration or maximum exploitation.

The tragedy has revealed profound regulatory and public policy deficiencies, as well as institutional failures that impede efficient and assertive government intervention, for example, in terms of restricted fishing areas, selective fishing methods, closed seasons, specimen sizes, minimization of incidental capture, maximum number of vessels, restricted fishing effort, thorough revision of all landings and credible penalizations to offenders, maximum quotas, transfer quotas, exclusive fishing rights and, above all, the creation of Natural Protected Areas with a fishing ban. These areas are fundamental for the creation of reproduction,

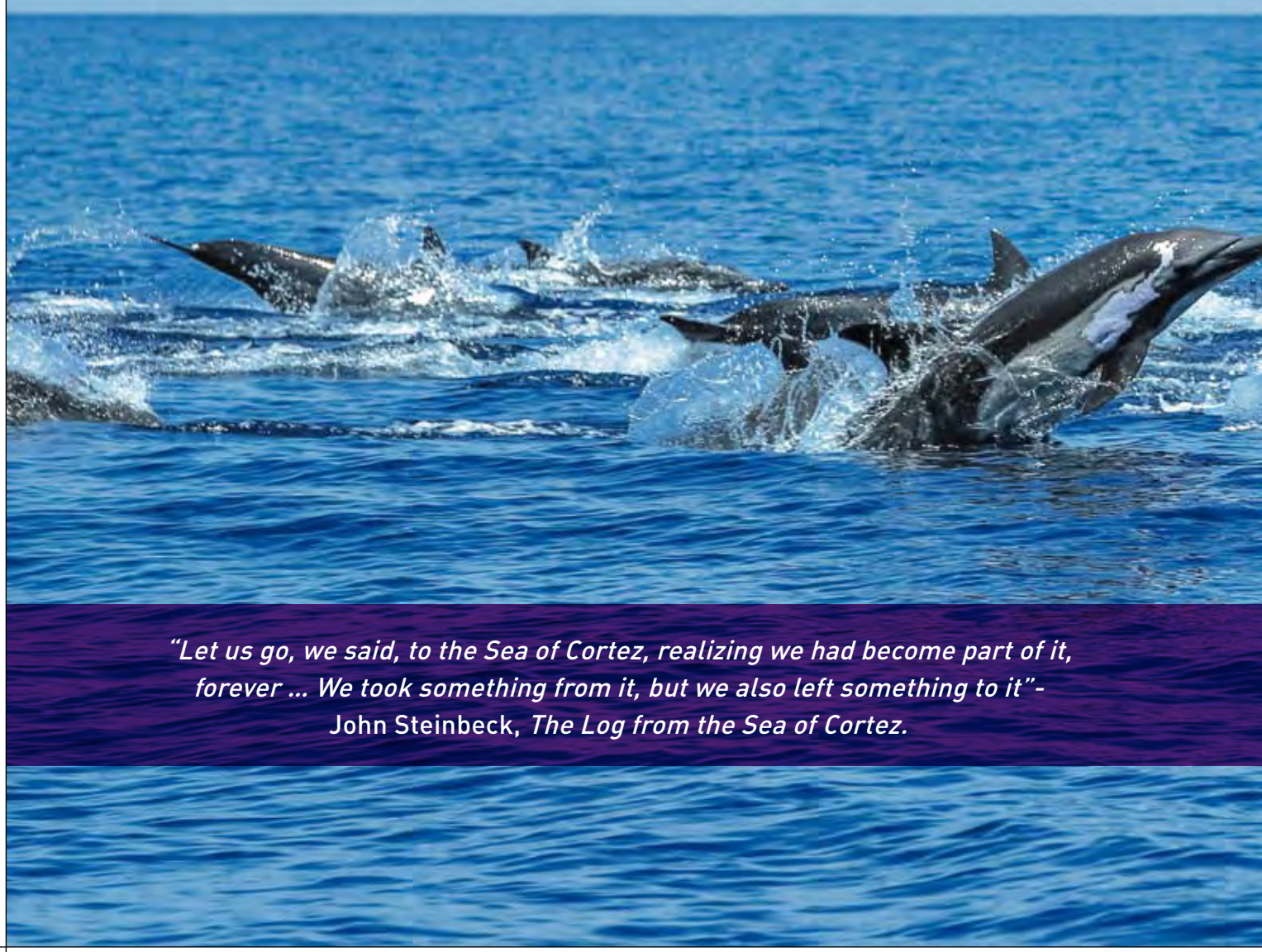
Mexico possesses a coastline of over 11 000 kilometers and a territorial marine surface and Exclusive Economic Zone that is 1.5 times bigger than its land territory.

hatchery and growth zones, to foster the recovery and conservation of the ecosystems and the trophic chains, allowing the movement of specimens and biomass to adjacent areas, where sustainable and more productive fishing activity could be carried out.

It is important to consider that bigger marine animals have greater reproductive potential, and these can only reproduce and multiply successfully in fishing free environments, such as the ones provided by Natural Protected Areas. This way, conservation could become the foundation of a flourishing, productive, competitive and viable fishing industry.

The beating heart of the ocean

By Alberto Tinoco Guadarrama | @albertotino



"Let us go, we said, to the Sea of Cortez, realizing we had become part of it, forever ... We took something from it, but we also left something to it" - John Steinbeck, *The Log from the Sea of Cortez.*

If you stare at the ocean long enough, you will be under the impression that you see the "Earth's cheeks" in the far horizon". But... close your eyes, just for a moment and listen to the breath that comes from the far depths. It is there where life began, it is that forgotten history that lives in our cells. And underneath the motionless solitude, lays the beating heart of the ocean.

We are talking of almost one thousand kilometers in length, with depths of up to three thousand meters, mountains and canyons still unbeknownst to us.

It is the youngest sea, but the world's most studied.

It is one of the five most diverse ecosystems in the planet.

It is part of the biological marine corridor of the Tropical Eastern Pacific. A natural life laboratory, with over 800 fish species, some 4 500 invertebrate species and a refuge for almost 40% of all the marine mammals in the world.

It is home to 136 500 hectares of mangle forest, the biggest and most productive in the Mexican Pacific.

Its biodiversity is part of the UNESCO World Natural Heritage.

Each year, over 2 million visitors come to their beaches, coasts, mangle forests, estuaries, rocky reefs and 244 islands and islets that shelter the source of animal protein that Mexico will require to secure its population's food supply in the near future.

The conquerors named it Sea of Cortez *(Mar de Cortés)*.

Jacques Yves Cousteau, the renown explorer and oceanographer, said it was the "Aquarium of the World". And it is ours, it is the Golf of California.

COLD, GREEN MURKY WATER!

In any place in the world, cold, green, murky water is the worst possible scenario for a photography expedition, but at the Gulf of California, you never know, everything is always just about to change. "Bad" scuba diving conditions will never be an excuse for the stubborn who, like me, want to tell a story. Something is happening here, and we want to find out. Quoting the writer and traveler John Steinbeck: Let us go, we said, to the Gulf of California.

In the Loreto area there are reports of a blue whale that seems to be lagging behind in its north migration.

In La Paz bay it is possible to observe humpback whales, the last of the season.

In the islets there is a colony of sea lions playing among the tourists, who are going crazy.

A family of three orcas has been seen, a female and two young; they reside in La Paz bay area. They are frantically followed by tourist operators.

The whale shark season is coming to an end at El Mogote.

Thousands of dolphins are following a sardine school close to the Espíritu Santo Island. And hundreds of stingrays join in a sort of senseless dance, in the unique horizon where the sea merges with the dessert.

Starting in the winter time, all through spring and almost until the end of the summer, images of the Gulf of California saturate Instagram, Twitter and Facebook. Everybody wants to be there.

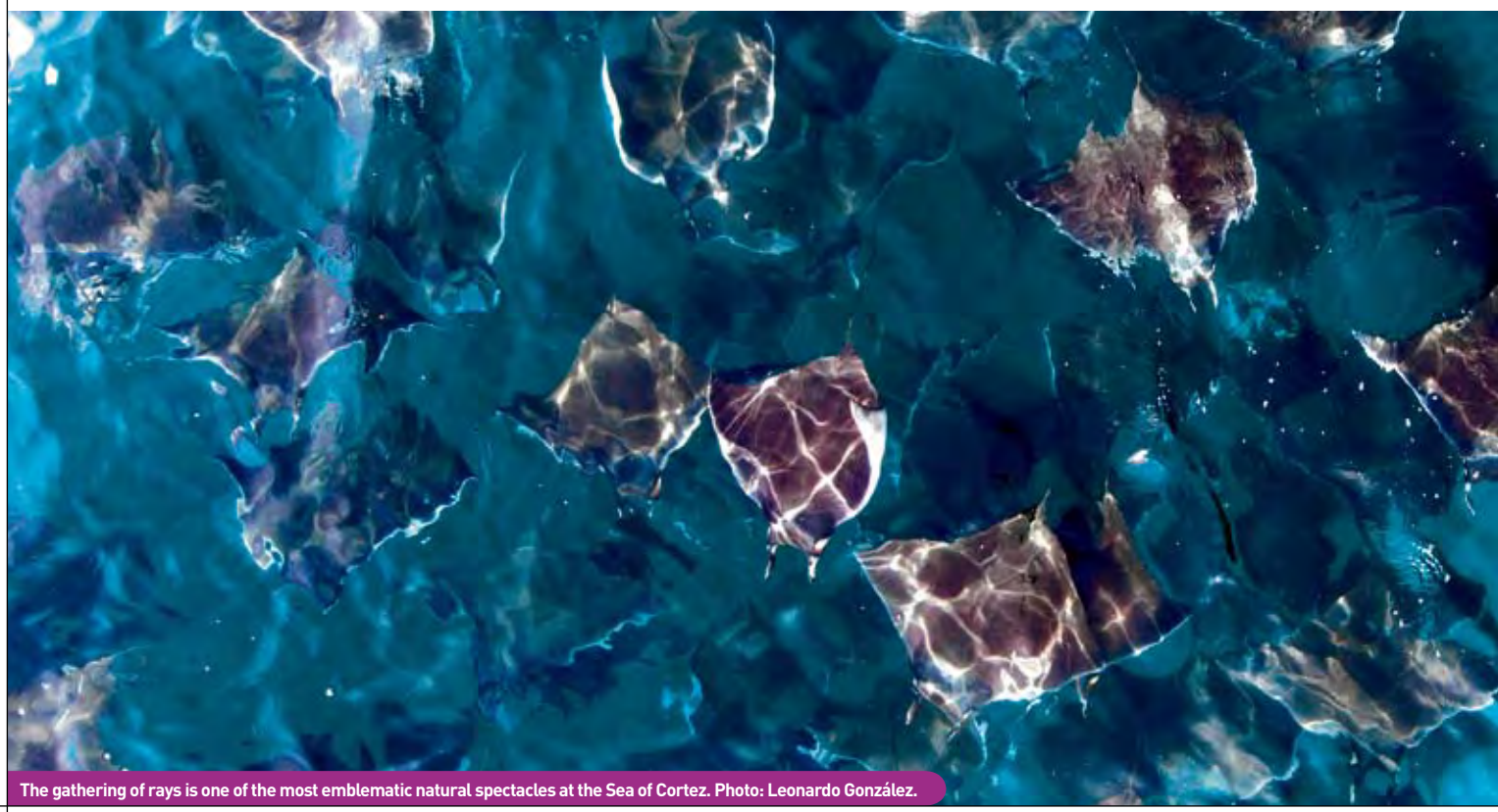
Dr. Arturo Ayala, Researcher of the University of Baja California Sur, and me dive deep into El Bajo, a scuba diving site in the Espiritu Santo Island. "Bocos", as Dr. Ayaya is known by his friends, was born in Mexico City, but long time ago he became a "choyero" (native from Baja California Sur). Arturo explains to me that the "Cortez Province" —identification name for the region of the Gulf of California— is the second most productive in Mexico in terms of biomass, with around four tons per hectare. According to the Long-Term Ecological Monitoring Program at the Gulf of California, which is published by the imitative DATAMARES, the Loreto region has the highest number of registered species with 270; El Corredor follows with 245; La Paz, with 235 and Cabo Pulmo with 201. Only 10 % of these species are of commercial interest.

LIFE UNDERNEATH

El Bajo in Espíritu Santo is a biodiversity sanctuary. We are on a journey to this submarine mountain that surprises us with the variety of fish. Ramón Castellanos, from the Coalition for the Defense of the Seas in Mexico (CODEMAR), leads the expedition with its camera. I follow closely together with the documentarist and photographer Fabricio Feduchy, who had the privilege to meet the iconic Ramón Bravo, the great Mexican scuba diver. Fabricio and I withdraw from the group while we watch a school of barracuda that moves in perfect synchronicity just in front of our eyes. I am only a beginner photographer, and not that good to be honest, but there is a strange feeling when you realize you are in front of a good shot. Fabricio stays next to the school and takes shots from different angles, following the barracudas.

El Bajo is a superficial depth, surrounded by an oceanic pit close to 800 meters in depth, which separates it from Espiritu Santo, allowing for sea currents and temperatures ideal for abundancy in biodiversity, according to the Northeast Center for Biological Research (CIBNOR) and the University of California in Davis.

All of a sudden, we observe an enormous smudge in the water column, it becomes thicker and bigger as we approach, until we are completely surrounded by thousands of microorganisms that cloud our visibility. Ramón Castellanos —from CODEMAR— records the moment with his camera. It is a "surge" of zoo plankton, which is made out of organic matter, fry, and larvae from clams, crustaceans and echinoderms, that live suspended in the water column and, although they are capable of moving by themselves, they drift away due to



The gathering of rays is one of the most emblematic natural spectacles at the Sea of Cortez. Photo: Leonardo González.

sea currents and whirlpools that come from the bottom of the sea carrying all the nutrients.

IT IS ALL CONNECTED

It is a phenomenon that can go unnoticed for many, but it is really exciting because it is the precise moment when you can feel the ocean's beating heart. The entire food chain is moving: anchovies, sardines and mackerels chase after their food. Right behind them there is a frenetic rush among the bigger pelagic fish from La Paz bay. We have managed to document the nutrients that support the surrounding fisheries, that serve as reproduction and shelter sites for the species, as well as being tourist attractions for scuba diving and sportfishing. Everything is connected in the Sea of Cortez.

We dive around the "Fang ming", a boat that was sunk intentionally in 1999 to create an artificial reef, close to Espíritu Santo. On the board area we see snappers of considerable size, which seem oblivious of our presence. In the lower hull section, some 20 meters down, it is possible to observe a small black coral colony, almost 1 meter tall. But it is in Punta Lobos where we can find a huge black coral forest. We deep dive, almost 133 feet (40 meters). I am following the researcher Jenny Carolina Rodríguez, who studies a disease that attacks corals in the Pacific. Jenny shows me the black coral colony, which grows with many ramifications, like bushes, but they are not plants, but small organisms called polyps that together make up the colony. Deep water

> IT IS SAID THAT FOR SEVEN YEARS NOW IT IS VERY RARE TO SPOT A HAMMERHEAD SHARK IN LA PAZ BAY. HISTORICALLY, IT HAS BEEN THE MOST CAPTURED SHARK IN THE REGION; ITS POPULATIONS HAVE EITHER MOVED OR DISAPPEARED.

corals have slow growing ratios, 8 to 22 micrometers per year. Human nails grow at a ratio of 36 millimeters per year, two thousand times faster than black coral.

We are now at La Reina, a diving site in the north tip of Isla Cerralvo. It is a reef with dense fish concentrations. I observe groupers and snappers and a school of dorados that surround me after just a few minutes. Some 25 meters deeper, there is a small canyon full of life. As I continue, gobies hide among the colonies of hard coral and green morays appear in the hollow cavities of the submarine mounts, decorated with starfish of all colors and sizes. I can see a zebra moray, sticking out its head, while Ramón Castellanos and Edgar Escobar, our dive master, record two stone fish that camouflage with the surroundings. Although they might seem shy, they are one of the most poisonous marine species.

We dive in Las Ánimas, a group of islets northeast of Isla San José. We go through a deep canal where we spot a few lobsters known as "slipper lobster". They are weird looking, seem almost prehistoric because of their flat shell. It is notorious that in almost all of our expeditions, we have found rests of harpoons, hooks and fishing nets. In a site known as El Pinaculo, I see from a distance our dive master signaling. When we come out of the water, an excited Edgar Escobar assures us he saw a hammerhead shark. There is no record on camera.

It is said that for the last seven years, it has been very difficult to see hammerhead sharks or *cornudas* as fishermen call them in La Paz bay. Historically, it has been the most captured species in the region and its populations have either moved or disappeared.

— And what about sharks? I ask to José Alberto Zepeda Domínguez, marine biologist who works in sustainable management projects for fishing communities in La Paz bay. He smiles, shakes his head and responds: "Sharks can be found anywhere, I found them in Ensenada de Muertos, 60 kilometers East from La Paz. There is a shark fleet there. Let's make it clear that shark fishing is legal. It is not banned to capture shark, except for a few protected species. For some to rest at ease, big sharks are not fished as they taste like ammonia. Small shark sells for better prices and it tastes really good, we call it *cazón*. I am not sure what kind of shark you are looking for, but ask the shark boats, they will know for sure where to find them".

— But I want to see them alive!

— They are alive... caught in the hooks of the fishing lines, he answered laconically.

At the end of my journey to the Gulf of California, I would like to mention a quote from John Steinbeck: "Men really need marine monsters in their personal oceans ".

REMEMBERING JOHN STEINBECK

Undoubtedly, the Golf of California is paradise, but it is hell too. Seventy-eight years ago, John Steinbeck wrote in his diary: "We took a small soft coral colony from a rock in a small aquatic world. And that is not terribly important for the tide. Fifty miles out, the Japanese shrimp boats are dredging the ocean, breeding tons of shrimp and quickly destroying the species so it never returns and, with the species, they are altering the ecological balance of the entire region. That is not very important in the world. And thousands of miles out, the great bombs are falling and the stars do not move that way. None of this is important, or perhaps everything is."

THE TRAGEDY OF THE COMMONS

Things have changed very little since then. The Japanese fleets no longer come, it is now the Mexican boats devouring the Gulf of California. Approximately 500 000 tons are captured every year. Sounds good, apart from the tuna purse seines, the shrimp trawling nets, the sardine nets and the shark long lines, that have not only collapsed some of the commercial fisheries, but have also increased incidental fishing of some protected species. There are more nets today, but less capture. Fisheries are overexploited.

The authorities, who should be regulating, leave the problem to the "tragedy of the commons". There is unfair competition between industrial fishing and traditional fishing, and between the small boats from Baja California Sur against the great fishing boats coming from Sinaloa and Sonora. And in between the lack of authority, there is illegal fishing that does no respect close seasons or specimen sizes or protected species.

Ismael Mascareñas, researcher from the Center for Marine Biodiversity and Conservation and coordinator of the Program for Long Term Ecological Monitoring, does not hesitate to point out that the Gulf of California is at risk. The most revealing fact is that between 1998 and 2017, the size of commercial fish has decreased up to 45 centimeters and 65% of reefs have been degraded.

There will be a point in which we will no longer hear the beating heart of the ocean, in the depth of the Sea of Cortez.

FROM GUERRERO NEGRO TO CABO SAN LUCAS:

The South Californian Pacific

Did you know that the Pacific Ocean is the planet's largest body of water with an area of 160 million square kilometers? It occupies one third of the globe and limits with the Arctic, Antarctic, Asia, Oceania and America... and its waters surround Baja California. Perhaps the part that touches the peninsula is minimal compared to the total area of this ocean, but you would be surprised to learn about the natural treasures this zone possesses: from Guerrero Negro to Cabo San Lucas (going south), we find different habits, home to thousands of species —some of them endemic—, besides being an area for the reproduction and birth of many other species. Which is the best known of all? Undoubtedly, the grey whale, which travels 8 000 kilometers, all the way from Alaska to Baja California. Another famous inhabitant is the feared, and misunderstood, white shark, which finds in this area an ideal nursery for its younger specimens. And let's not forget about the colonies of seals and sea lions.

The vast biodiversity of Baja California Sur is possible because of one reason: in this geographical region the cold and nutrient rich northern cold waters collide with the warm southern waters, creating the ideal conditions for this burst of life to occur.

THE COUNTRY'S LONGEST COASTLINE

Baja California Sur is the longest coastline in our country: 2 230 kilometers. One portion corresponds to the Sea of Cortez, the gulf located between the continent and the peninsula, and the remaining part corresponds to the Pacific Ocean: 1 400 kilometers. Despite the fact that Cousteau called the Sea of Cortez the "Aquarium of the World", the Pacific Ocean coast does not lag behind.

So, let's imagine we travel the South Californian Pacific from north to south to discover its ecosystems, from the deep seas to the mangle forests, going through its estuaries. This imaginary journey would have to begin at the North 28 Parallel, the exact point where the peninsula splits in two states and the Vizcaíno Biosphere Reserve starts, with its two million hectares of protected areas, being one of the largest natural protected areas in the world.

Looking to the Pacific, in the north of the state, we find Guerrero Negro, home to the largest salt mine in the world. The Ojo de Liebre Lagoon, known to the world for being the reproduction and hibernation site for the grey whale, is located in the same area. But, the grey whale is not the only creature that depends on the lagoon, other animals such as the California sea lion, the northern elephant seal, the common seal, the blue whale as well as turtles and birds also live there or are frequent visitors.

In the proximity of Ojo de Liebre, following the coast line, we find several fishing villages: Bahía Tortugas, Bahía Asunción and Punta Abreojos (*abreojos* literally translates to open your eyes and it refers to the difficult sailing conditions of the area), all of these towns live on the capture of representative South Californian species such as lobster, abalone, oyster and marine snail. Besides, their beaches are ideal for surf and kite surf and attract tourists, mainly

Los Cabos, Baja California Sur.

those who seek quiet places, away from civilization, where time seems to stop.

Going south and leaving behind the Vizcaíno Biosphere Reserve, there is still a lot to discover. For example, in the central region of the peninsula, we find places like La Bocana, with its estuary surrounded by mangles and coastal dunes. Sportfishing expeditions depart from this point. The reward for the most skillful are the sailfish, tuna or dolphinfish. Also, in the central region, stands the community of San Juanico, a town with a population of barely 500 people, which every year during the summer and winter months, receives national and international surfers in search of the tallest waves in the world. Going further south, in Bahía Magdalena, we find the ports of San Carlos and Adolfo Lopez Mateos, which are mainly fishing communities, but also excellent observation sites for the grey whale as well as for sportfishing of swordfish, marlin and grouper among other species. Further south, there are more surprises like the magic town of Todos Santos and of course, Cabo San Lucas, with its grand class tourism resorts.

HABITAT AT RISK

A variety of ecosystems, fisheries of the utmost importance to our country, a UNESCO World Heritage reserve, a coastline home to sanctuaries for whales and birds alike, the longest extension of coastal dunes and a thriving touristic industry, all of these are found in the South Californian Pacific, whose worth is incalculable... and yet, as it happens with everything in our country, is at risk of being lost forever.

Which is the main threat? Fishing overexploitation. According to the article by several authors for datamares,org "How is fishing done in Mexico?", abalone and scallops were counted by the millions in the 70s, and now a days barely by the thousands.

Another case is the shark: The Marine Sciences Interdisciplinary Center in La Paz warns that overexploitation is affecting marine life. The decrease in shark numbers has caused that other predators, like squids, to decimate the populations of smaller fish, breaking the delicate balance of the seas.

The question is then, is it possible to take advantage of the South Californian Pacific without affecting it? The good news is that the answer is yes ... as long as it is done responsibly, respecting the closed seasons —for shrimp, sea cucumber and octopus—, looking for other forms of tourism, like rural or non-consumptive, respecting the limit of boats that can go out to see the seal colonies or whale sanctuaries, refraining from having contact with the animals, like touching baby seals or baby whales and, above all, being aware that the value of the region lies within its ecosystems. If these are lost, then there is nothing left.

Where is the South Californian Pacific?

AN OCEAN OF PLASTIC

By Ana Lucía Altamirano I @airedetina

A plastic polluted ocean can cause up to
13 000 MILLION
dollars losses per year.

Each Mexican can use up to
38 000 PLASTIC STRAWS
in its lifetime.

In a year, plastic in the ocean causes the death of
ONE MILLION BIRDS
and **100 000 MARINE MAMMALS** of different species.

Today there are more than
150 MILLION TONS OF PLASTIC WASTE
in the ocean.

90% **OF THE FLOATING TRASH**
in the ocean is made out of plastic.

HOW LONG DO PLASTICS TAKE IN DISAPPEARING FROM OUR PLANET?

- **Paper napkin:** From two weeks to one month (after it has been thrown away).
- **Styrofoam cup:** 1000 years.
- **PET bottle:** 100 years.
- **Shoe sole:** 65 years
- **Plastic bag:** 150 years.
- **Battery:** 500 years.
- **Diaper:** 450 years.
- **Can of aerosol:** 30 years.
- **Can of soda:** 10 years.
- **Chewing gum:** 5 years.
- **Cigarette butt:** 2 years

Sources:
- Ellen MacArthur Foundation
- New Plastic Economy
- Ocean Conservancy
- UN
- Parley for the Oceans
- Save on Energy
- SEMARNAT

Mexico is ready to protect the "Aquarium of the World"

By John Kerry I @JohnKerry

Human activities worldwide are affecting the oceans, which currently face unprecedented threats such as overexploitation of fisheries, loss of coral reefs and coastal pollution and erosion due to rising sea levels. In the light of these events, many brave nations have recognized the importance of healthy oceans and have committed to fight these threats. Because of its leadership, Mexico has been an exemplar country in this respect.

We know the intention of Mexico to create a large Marine Protected Area (PMA) in order to safeguard the enormous wealth of Sea of Cortez and the Pacific coast of Baja California Sur. This excellent news comes a year less than President Enrique Peña Nieto declares the Revillagigedo Archipelago, a chain of pristine islands in the Mexican Pacific, as the National Park with about 150 000 km^2, completely protected from extractive activities.

However, Mexico's efforts to protect its seas started with a much smaller area, the Cabo Pulmo National Park (located in Baja California Sur), which is considered a success worldwide. Science shows that PMAs guarantee the survival of marine animals such as whales, dolphins, sharks and turtles, but are also beneficial to adjacent fis-

heries. Cabo Pulmo is a clear example of this.

Cabo Pulmo was declared a National Park in 1995, as a result of a collaboration process between the local community, NGOs, scientists and government officials. One of the most amazing results is that over the past10 years, the fish biomass in the area has quadrupled. This means that fish can grow and mature within the protected area and can also move from this area due to the spillover effect. Once out, fish can be captured and support the local fisheries for generations to come.

Each year, Cabo Pulmo attracts close to 30 000 tourists interested in seeing healthy coral reefs, sea lions, hammerhead sharks, Pacific giant stingrays and other marine animals. The park is therefore capable of creating well-paid jobs and giving economic certainty to the community, whilst improving their standard of living.

The model used in Cabo Pulmo has been replicated worldwide. Earlier this year, the Chilean President, Michelle Bachelet, established the protected marine area of Rapa Nui around Isla de Pascua, thoroughly protecting an area close to the size of the continental territory of this South American country. It was established in agreement with the Rapa Nui people, with the purpose of safeguarding traditional fishing methods, unique ecosystems and biodiversity, as well as preserving ancestral livelihoods for the generations to come.

On the other side of the Pacific, President Tommy Remengesau declared the small insular nation of Palau as National Marine Sanctuary, thoroughly protecting 80% of the waters of the country. The same decree establishes a fishing zone for the exclusive use of their local fishermen. The Palau Sanctuary provides marine resources for the local market and, fully satisfies the growing touristic market, which every year generates millions of dollars.

The creation of a vast marine reserve in the Sea of Cortez and the Pacific Coast in Baja California Sur could have a very positive effect on thousands of fishermen from adjacent local communities, as well as for many marine species including shark, dolphin, whale, tuna, stingray and turtle. The project contemplates allowing local fishing, which would grant communities rights over coastal waters for the first time in history.

If it goes ahead, populations of fish would continue to recover over time and the spillover effect out of the protected area would improve the capture index for future generations of fishermen.

I would like to take this opportunity to congratulate the Mexican people for this new initiative and express my confidence that the President-elect will continue to work to strengthen the legacy of Mexico to the Ocean, to benefit coastal communities with more fish, more tourists and more well-paid jobs.

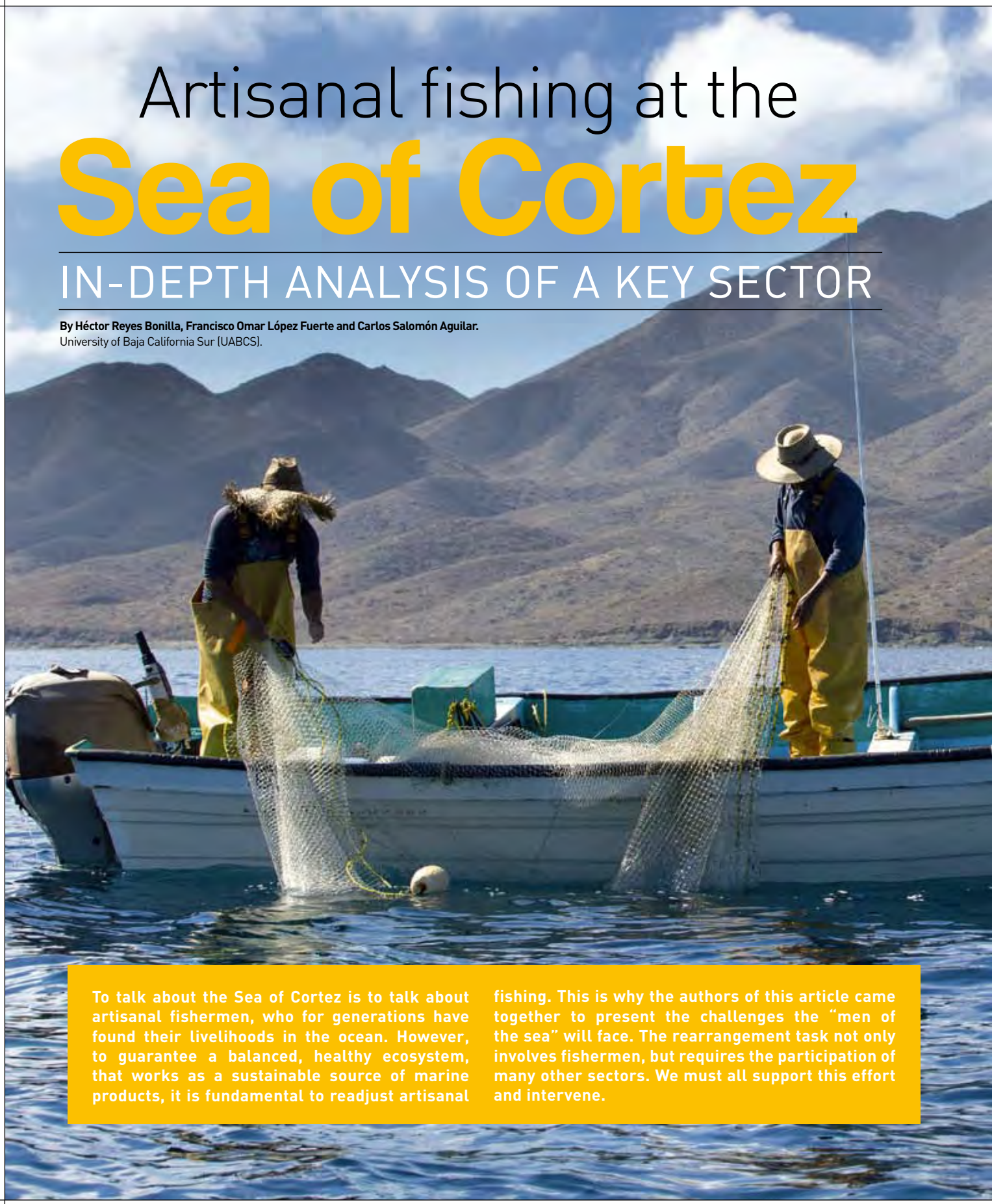
ABOUT THE AUTHOR

John Kerry is former US Secretary and former Democrat Senator for Massachusetts. He led the first Our Ocean Conference in 2014, creating a forum for politicians, scientists, environmentalists and industry leaders to gather to discuss the state of the oceans as well as the steps required to protect it and the solutions ahead.

Artisanal fishing at the Sea of Cortez

IN-DEPTH ANALYSIS OF A KEY SECTOR

By Héctor Reyes Bonilla, Francisco Omar López Fuerte and Carlos Salomón Aguilar.
University of Baja California Sur (UABCS).



To talk about the Sea of Cortez is to talk about artisanal fishermen, who for generations have found their livelihoods in the ocean. However, to guarantee a balanced, healthy ecosystem, that works as a sustainable source of marine products, it is fundamental to readjust artisanal fishing. This is why the authors of this article came together to present the challenges the "men of the sea" will face. The rearrangement task not only involves fishermen, but requires the participation of many other sectors. We must all support this effort and intervene.

SOCIAL BENEFITS

Artisanal fishing is usually carried out in boats less than 10 meters in length, and it is a very relevant activity at the Sea of Cortez. In this region, just over 55 000 fishermen generate more than 50% of the country's total traditional capture, and their work employs some 90 000 people, men and women, who operate 250 processing plants or commercialize their products in Mexico and abroad.

Their fishing effort is mainly concentrated in the south of Sonora and along the coast of Sinaloa, a very productive region biologically speaking. The commercial value of traditional fisheries in the Sea of Cortez was estimated to be approximately 575 million pesos in 2016, and to keep up the activity in 2017, the government invested over 700 million pesos to modernize 18 000 boats. To sum up, the fishing activities in the Gulf of California offer great benefits for those involved in the actual work and for us consumers.

RESOURCES

The fishery at the "Aquarium of the World" is multispecific, and an important part of the capture are "scaly fish", including comber, snapper, red snapper, sole and mackerel. Furthermore, there is significant capture of invertebrates —octopus in particular—, many kinds of clams and scallops, and species that are not consumed in Mexico but are valuable in the international markets, such is the case of the cannonball jellyfish and the sea cucumber.

FISHING TECHNIQUES

A wide variety of capture systems are used at the Sea of Cortez. The National Fisheries Charter includes lines, hooks and nets for scaly fish, semiautomatic diving equipment ("hooka") for octopus, clam and scallop capture, purse seines for squid and ray and trawling nets (with exclusion systems for turtles and fish) for shrimp capture, traps for crayfish, crab and lobster and motor-pumped squirting systems for geoduck clams.

NEGATIVE EFFECTS

According to the federal government, 75% of the country's marine resources are at their maximum sustainable level of exploitation. Species under such conditions are being extracted at a pace that reduces competition amongst individuals, therefore allowing the following generation to have similar success possibilities and, as a result, fishing continues to be viable. Unfortunately, this breakeven point fluctuates due to environmental factors or errors in the allocation of fishing quotas, and this leads to the deterioration of the fishery. Currently, 15% of the marine resources in Mexico and the Gulf of California are overexploited.

The problem is not new, and in past decades, the lack of regulation caused the overfishing of the totoaba, turtle

and shark to such extent that the government had to intervene and put extreme measures in place, such as the total ban. Another factor that contributes to overfishing is the lack of accurate information regarding captures, as there is no certainty about the real level of exploitation of the species.

In this sense, the National Fisheries Charter encourages the problem because for example, many fish species are considered together as "scaly", and it is impossible to handle them efficiently. Lastly, illegal fishing continues in the gulf and, a competitiveness analysis from the Mexican Competition Institute —published in 2013— indicates that this could represent up to 50% of the capture. The issue does not have an obvious or immediate solution, but it is probably the primary obstacle for the good management of the fishing stocks.

CHALLENGES AHEAD

As we mentioned before, fishing is a key activity at the Sea of Cortez due to its economic, social and cultural relevance and, the situation for most of its resources is still acceptable. Nevertheless, it is essential to work not just to maintain the current state, but to recover the population levels of the species that have been most affected over the years.

The best way to achieve this goal is by concentrating the knowledge of all the players involved. It is fundamental to increase surveillance to reduce illegal fishing to the minimum; it is also key to create fishing refuges and grant concessions that give certainty to fishermen over the use of their resources. On the other hand, fishing communities should abide by the laws and regulations and keep accurate records of their capture to allow the correct allocation of fishing quotas.

Civil organizations must keep up with their environmental education programs and support fishermen in their organization efforts. Academics also have a very important role to play by providing scientific information to all sectors for the better management and preservation of the resources. The collaboration of all parts can truly lead us to a systemic approach for the design of Readjustment Programs and Management Plans to allow sustainable fishing.

Figures for artisanal fishing at the Gulf of California

55 000 fishermen generate over 50% of the country's total traditional capture.

It creates close to **90 000 jobs.**

The commercial value mounts up to **575 million** pesos.

15% of the marine resources at the Sea of Cortez are overexploited.

THE CIVIL SOCIETY IS KEY FOR THE PROTECTION OF THE OCEAN

By JP Geoffry

The conservation of the planet's oceans is a job for everyone... everyone! Including you and I. That is something which the author of this text is convinced of. JP Geoffroy is the leader of the Sea Shepherd Conservation Society, which is an organization that sums up the efforts of citizens from all over the world, who even put themselves at risk, to avoid the destruction of marine ecosystems and the slaughter of the species that inhabit them. To achieve this, they investigate, expose and confront the illegal activities that take place in the planet's oceans.

Since its foundation —in 1977—, Sea Shepherd has collaborated at different government levels in the countries it operates on, regardless of the color of the political parties in power, to express what the community and the planet require. These collaborations range from legal counsel to putting their vessels and volunteers at the service of the State to work together for the protection of one or more species.

In my years working in conservation (more than eight), I can say plainly that the participation of the Civil Society in the protection of the environment is fundamental; but they are not solely responsible, I am truly convinced that every part of the community should protect and contribute to this titanic effort.

For the case of Mexico, Sea Shepherd operates in the Alto Golfo de California (Sea of Cortez) in coordination with other organizations like the Whale and Ocean Sciences Museum, and local fishermen —all recognized by the Department of Environment and Natural Resources (Secretaría de Medio Ambiente y Recursos Naturales SEMARNAT)—; the objective of these actions is to protect the porpoise, an endemic, seriously endangered species.

Since Operation Miracle, driven by Sea Shepherd, started in this region of the Mexican sea, we have removed approximately 100 tons of illegal fishing gear in the zone, which is considered a safe haven for the porpoise.

Based on the results obtained so far, I am certain that what is really saving the porpoise is the removal of fishing gear which is killing them, I am referring to the nets left behind by illegal fishermen, that are not only killing porpoises but also other species such as the white sea bass, hammer shark and sting ray, which easily get caught is these mortal traps.

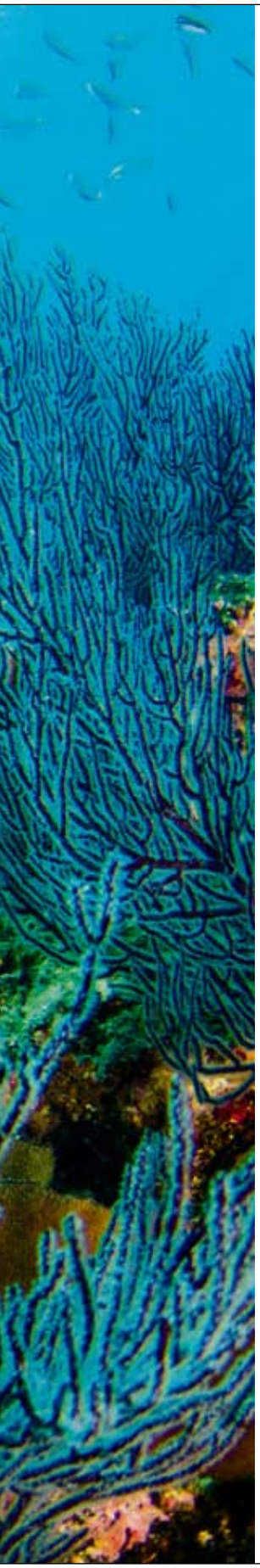
From my perspective, this unfortunate situation is caused by a characteristic which is common to all humans: greed. In other words, our unstoppable desire for money, without thinking about the damage we are inflicting to the planet.

Any way in which the society collaborates with the protection of our planet is welcome, considering we are all responsible for it, starting with you, the reader of this article. We must learn to look beyond and understand how our way of life has an effect: plastics, deforestation, pollution and others. We are all part of the problem and therefore we should all be part of the solution; we must find a way to reconcile development and environmental protection.

A common sustainability vision for the Sea of Cortez

By Catalina López Sagástegui
Director of the Marine Program for the Gulf of California

We all have the same objective: the well-being of the communities.



Mexican seas are abundant in treasure. From coral reefs filled with colorful fish scuffling between the gorgonians, to deep blue waters abundant with majestic species like squids, sharks or giant rays swimming in search of food. Travelling our coasts is an adventure that leads us to coastal lagoons which every winter witness the birth of a new generation of grey whales, sandy beaches that wake up to the arrival of sea turtles and estuaries and lagoons surrounded by green mangle forests rich in shrimp, clams and fish which provide livelihoods for thousands of fishermen and their families.

The biodiversity of the Gulf of California makes it a valuable asset for the fishing and tourist industries, as well as for the conservationist sector, which already has a long history of work in the protection of the area. Considering the growing food demand, a tourist industry on the rise and fisheries at their maximum capacity, finding how to meet the needs of each sector is a constant challenge.

The conservation vs. fishing challenge is not new. Historically, it has been tackled as if these were mutually exclusive issues. Both sectors seek solutions within their remit, without communicating and without recognizing their limitations. This kind of approach has caused environmental catastrophes such as the one currently occurring at the Alto Golfo de California. The pressure to protect the porpoise has been of no benefit to the species itself and it has incentivized illegal fishing (affecting another endangered species such as the totoaba). Today, communities rely on unsustainable subsidies and struggle to adapt to a reality that includes fishing, whilst uncertainty is on the raise and quality of life deteriorates.

We must not ignore the fact that fishing is an income generator for the communities surrounding the Gulf of California. Over one million tons of marine products are produced in this area, which are equivalent to 5 500 million pesos. However, the abundance of natural capital in the area is not infinite and has now reached very serious levels of overexploitation.

The solution is not spending more time at sea or start profiting from new species to compensate for the economic losses derived from collapsed or deteriorated fisheries. The fishing sector must lower its dependence on public funding which only increases the fishing effort, distorts the markets' behavior and prevents Mexico from reaching its sustainability goals.

> WHILE THE FISHING, TOURISM AND CONSERVATION SECTORS PUSH THEIR INDIVIDUAL AGENDAS, SCIENCE MUST BE THEIR GUIDE TO SUSTAINABILITY.

The conservation sector, on the other hand, must learn to be more inclusive and to navigate in a variety of contexts and modify their strategies, without compromising their sustainability vision. Conservation must find a balance between the intrinsic and the perceived value of biodiversity; it must always strive for social welfare. The solution to our sustainability crisis is not limiting the access to our natural resources, more so when there are no real human possibilities to comply with such measures.

It is urgent to create a multidisciplinary vision for the Gulf of California, one that integrates collaboration goals and strategies. This is the biggest challenge. While the fishing, tourism and conservation sectors push their individual agendas, science must be their guide to sustainability. It is time for Academia to become more involved and play an active role in the discussion. Science must be neutral and objective and must feed discussions about the use and care of the natural resources.

We all have a common goal: the welfare of the communities. Social development, in every aspect, must be the motivation for sector leaders to achieve a balance between the use of the marine resources and the health of the ecosystems in the Gulf of California.

ABOUT RODS, HOOKS

SPORT FISHING: CONSERVATION ALTERNATIVE

By Amaya Bernárdez y Francisco Ursúa

Sportfishing is a great opportunity to encourage tourism in our country, attract visitors and generate income, especially for Baja California Sur. However, it must be based on smart decisions that guarantee the conservation of the Mexican Seas and the marine species that inhabit them.

DEFINITION

Sportfishing is a recreational touristic activity that consists in the capture of wild species using a rod with a hook and live or artificial bait. It is practiced in seas, coasts, rivers and inner water bodies worldwide, on foot from the shore or from a boat, either static or in motion.

CONTEXT

In Mexico, the activity takes places in most of our coasts, as well as in approximately 50 reservoirs. It focuses on 99 species, out of which 80 are marine species and the remaining 19 live in freshwater bodies.

There are about 14 000 sportfishing boats that bear the national flag and an annual influx of an average 18 000 international vessels spread over our waters as follows: 65% in the Pacific Ocean, 11% in the Gulf of Mexico and the Caribbean, and the remaining 24% in continental waters.

TARGET SPECIES

LARGER SPECIES (BILLFISH)

They live in warm and tropical waters, they are migratory species and highly appreciated for their strength and size.

STRIPED MARLIN
(TRETAPTURUS AUDAX)

BLUE MARLIN
(MAKAIRA NICRANS)

BLACK MARLIN
(MAKAIRA INDICA)

SAILFISH
(ISTHIOPHORUS PLATYPTERUS)

SWORDFISH
(XIPHIAS GLADIUS)

SMALLER SPECIES

DORADO
(CORYPHAENA HIPPURUS)

ROSTER FISH
(NEMATISTIUS PECTORALIS)

OTHER SPECIES OF COMMERCIAL INTEREST

YELLOW FIN TUNA
(THUNNUS ALBACARES)

WAHOO
(ACANTHOCYBIUM SOLENDARI)

MACKEREL
(TRACHURUS PICTURATUS MURPHYI)

AND BAITS

SPORT FISHING

Baja California Sur is, by far, the state where sportfishing is most practiced, with four main destinations: Los Cabos, Los Barriles–Buenavista, Loreto and La Paz.

The first of these destinations offers 73% of the total hotel infrastructure and associated services, and it welcomes each year 65% of the total influx of sport fishermen (Ibáñez Pérez et al. 2016). Los Cabos is home to all of the sportfishing species, which makes it a privileged site.

FISHING TOURNAMENTS

In 2016, the National Commission of Aquaculture and Fishing (Comisión Nacional de Acuacultura y Pesca CONAPESCA) reported 254 sportfishing tournaments, 142 in marine waters and 112 in freshwater bodies across the country.

In 2017, 5 000 sport fishermen from 820 teams from a variety of countries came to Mexico.

The most important sportfishing event in terms of attendance and prizes is the Offshore Bisbee's International Sportfishing Tournament in Los Cabos, with 124 teams expected to attend and total prizes mounting up to 7.5 million dollars. It is considered the best prized tournament in the world.

SPORT FISHING IS A HIGHLY PROFITABLE ACTIVITY, AND THEREFORE ITS ENCOURAGEMENT MUST CONSIDER THAT COMMERCIAL SPECIES MUST HAVE SUSTAINABLE AND PLANNED MANAGEMENT AND DEVELOPMENT.

EFFECT ON THE WILDLIFE

If sportfishing occurs on a catch and release modality, it may be considered as a sustainable option. However, scientific sources show that the mortality of the extracted species varies depending on the species and the seven elements listed below, in order of importance:

1. **Location of the hook:** If the hook touches a vital organ, the survival rate decreases significantly.
2. **Type of bait:** Live bait increases the risk of the fish swallowing the hook and therefore the survival rate decreases.
3. **Type of hook:** "J" hooks are ingested more easily than circle hooks, which also reduce the risk of damaging vital organs.
4. **Depth of capture:** This factor is related to the swim bladder of the fish. The greater the capture depth and extraction speed, the higher the possibility of inflicting damage to the swim bladder.
5. **Water temperature:** It has been documented that higher water temperatures appear to increase mortality rates.
6. **"Fight" time:** "Fight" is the stage where the fish and the fisherman try to beat each other. The longer this period is, the stress associated to physiological changes increases and with it the mortality rate.
7. **Exposure to air:** Once the fish is out of the water, and while the fisherman removes the hook, the fish has no oxygen, which together with the capture stress, might prolong the recovery period. Shorter air exposure times increase survival rates.

WHAT HAPPENS IN BAJA CALIFORNIA SUR?

- **400 000** people, mostly international visitors, fish every year in BCS.
- The average expenditure per person is estimated at **1 785 dollars**.
- The outlay exceeds **1.1 billion** dollars per year.
- The activity generates more than **24 000 jobs.**

Sources:
- National Commission of Aquaculture and Fishing (Comisión Nacional de Acuacultura y Pesca CONAPESCA).
- The Billfish Foundation.

SHARKS AT SEA OF CORTEZ: CURRENT STATUS AND CONSERVATION OPPORTUNITIES

By James Ketchum I @PelagiosKakunja
Pelagios Kakunjá A. C.

ECOLOGICALLY SPEAKING,
WE COULD CONSIDER
THE **HAMMERHEAD SHARK**
ALREADY EXTINCT
IN THE GULF OF CALIFORNIA;
OVERFISHING,
DECAY OF THEIR
NATURAL HABITAT
AND CLIMATE CHANGE
HAVE BEEN LETHAL
FOR THIS CHARISMATIC
MARINE SPECIES.
HOWEVER,
NOT ALL IS LOST.
SCIENCE CAN OFFER
AN EFFECTIVE SOLUTION
TO RECOVER
THE POPULATIONS
OF THE **"KING OF THE SEAS"**
WHO USED TO INHABIT
THE SEA OF CORTEZ.

"Look, a toadfish!" shouted Félix Higuera, sailor of the scuba diving boat Don José, just as I was getting ready to scuba dive at a place known as the shark alley in a small island at the Gulf of California. That morning we saw a whale shark on surface, and as I dived in the blue summer waters, I saw several more specimens some 30 meters below the surface, around a pinnacle. Then, we saw many other species such as whitecaps, red snappers, turtles and some hammerhead sharks. Further ahead, there was a school of skipjack tunas and then some 100 hammerhead sharks, just above the low south.

That was the outlook in Las Ánimas Islet back in 1994. Now a days the it is quite different, 20 years later, when scuba diving in the same location the only thing we can observe is an almost lifeless rocky bottom, only small fish can be spotted. No sharks. We can tell the same story about El Bajo de Espíritu Santo (underwater mountain), which in the 90s had plenty of tuna and hammerhead shark swimming in spirals of up to 100 specimens. Nowadays there is little or nothing left of this abundant marine life.

The common hammerhead shark *(Sphyrna lewini)* was also abundant in many other underwater mountains in the Gulf of California. During the 70s and 80s schools could reach up to as many as 300 specimens. Today, the presence of this species is so low it can be considered extinct in this sea.

The abundance of sharks and other marine species varies from generation to generation (shifting baselines), and it becomes evident because in what us, human beings, observe in the nature that surrounds us.

There are approximately 40 shark species in the Gulf of California out of which 12 are catalogued as *Threatened*; out of that list, 10 are considered as *Vulnerable* (the thresher shark, the silky shark and the Mako shark, among others) and 3 are considered as *Endangered* (the common hammerhead shark, the giant hammerhead shark and the whale shark).

The main threats for sharks in this region are overfishing, decay of their natural habitat and climate change. Overfishing and the lack of management of some areas have caused the collapse of shark populations in the last few years, particularly those species who come close to the shores as they frequently get captured, such are the cases of the blacktip shark and the hammerhead shark. Equally, those species who swim away from the shores and are associated to islands or underwater mountains are highly vulnerable to industrial fishing.

The common hammerhead shark is of very high value to the fishing industry in Mexico because of its fins and also as a resource for ecotourism in places such as the Revillagigedo National Park, and historically in Bajo de Espíritu Santo and Las Ánimas. However, this species is not protected in our country and there are no management plans or other conservation tools in place to protect it; internationally it is considered as Endangered (refer to the IUCN list). The only measure in place is the annual closed season during the months of May, June and July implemented by CONAPESCA in 2012.

One of the most critical problems of this situation is that when the populations of top predators decrease so dramatically, these are replaced by smaller predators (meso predators) such as rays, dogfish sharks and squid, which can become so abundant that they decimate their prey populations (small fish or invertebrates), causing an unbalance in marine ecosystems. This is known as trophic cascade. An example of this was observed in the Gulf of California with the almost extinction of the hammerhead shark in the late 90s, which coincided with the super abundance of jumbo squids, which consume large quantities of pelagic red crab, other meso pelagic fish and sardines, and the arrival of a new top predator: the sperm whale.

The deterioration level of places like Las Ánimas and El Bajo de Espíritu Santo really stands out, especially considering the importance they had for scuba diving, sportfishing and commercial fishing since the 70s up until the first decade of the new millennium. There was a time in which these sites were the best places in the world to scuba dive, with numerous schools of hammerhead sharks, which attracted world famous marine filmmakers like Howard Hall, and also renown scientists like Peter Klimley or Sylvia Earle, who remembers that in her first scuba diving expedition in Las Ánimas back 1965 there were "as many hammerheads as stars in the sky".

It could well be said that the abundance of hammerhead sharks was the beating heart of the tourism industry in La Paz (Baja California Sur) during the 80's and 90', when many ecotourism companies offered scuba diving expeditions to Las Ánimas and El Bajo de Espíritu Santo to observe the schools of hammerhead sharks. It is appalling that sharks have disappeared from these sites.

This was one of the made reasons that motivated me to found Pelagios Kakunjá in 2010, together with my friend and colleague Mauricio Hoyos. We are a not for profit organization whose efforts are dedicated to the study and conservation of the ray and shark species in Mexico, many of which are threatened or endangered on a global scale. One of our goals was to generate technical information for the regional management of the species and the implementation of conservation strategies for these species in Mexico.

A few years later, with the results from our research, we were able to contribute to the declaration of the Revillagigedo Islands as UNESCO World Heritage and to the expansion of the marine reserve. The research on shark and ray movements by Pelagios Kakunjá —together with Pacific Manta Research Group and MigraMar— was a key element for UNESCO to recommend the Mexican government in 2016 the expansion of the area of the Islands' Marine Reserve from 6 to 12 nautical miles. Furthermore, we supported the CONANP with crucial scientific information for the Justification Study prior to the declaration of the Revillagigedo National Park and, we proposed the creation of a larger and more effective marine reserve to protect sharks, rays and other vulnerable migratory species in the Mexican Pacific. The culmination of our efforts came in November 2017, when the Revillagigedo Islands became the largest National Park in North America with an area of 148 000 km^2. This proves that technical information derived from scientific research is of great value for the creation and implementation of effective marine conservation programs.

We can definitely say that not all is lost for the Gulf of California. The implementation of the closed season for sharks which started in 2012 has begun to show signs of recovery in the populations in Las Ánimas and El Bajo de Espíritu Santo, where we have recently spotted small schools of hammerhead sharks and other species such as silky shark and tuna. This means that if more effective management tools are used, like the creation of protected marine areas, we could recover the shark populations, and with this, the pelagic systems in the south of the Gulf of California.

The NGO Pelagios Kakunjá generates scientific information that reinforces the protection of different marine species at the Sea of Cortez, such is the case of the hammerhead shark. Photo: James Ketchum.

FISHING SUBSIDIES: PERVERSITY AND ENVIRONMENTAL DETERIORATION

By Maximiliano Bello I @max_bello_m
First Official for the International Conservation Unit at The Pew Charitable Trusts

The world's oceans are threatened. Few threats are as lethal as subsidies for industrial fishing; I even dare to say these are extremely damaging because they ultimately encourage the overexploitation of the oceans.

The latter occurs because fishing subsidies ignore or forget the rules that prevail in nature. What I mean is that fish and marine ecosystems have their own timings and capacities, and therefore a population or species can only be exploited to a certain extent. Pass that limit, species collapse and disappear commercially or biologically.

However, for political reasons, state, regional and local governments have historically granted endless subsidies to fishing, with the idea of giving stability to the industry, safeguarding the jobs it creates and the alleged "development" it brings. But the sector has forgotten that the oceans and their resources do not respond to these timings or interests.

Through subsidies, we have created industries that have collapsed fisheries all around the world. Access to state-of-the-art fishing technology or deep-water fishing could not be possible was there not a constant flow of external financing (obtained of course through subsidies). If it was not for subsidies, industrial fishing would not be a profitable business.

For example, boats that fish in remote locations make

> SUBSIDIES TO BIG COMPANIES ONLY INCREASE THE GAP BETWEEN INDUSTRIAL FISHERMEN AND TRADITIONAL FISHERMEN.

it all the way there thanks to the subsidies they receive and use for fuel, boat maintenance and construction of new and more equipped vessels.

By maintaining this financing scheme, without considering the biological or ecological aspects of the commercial species, we create a false development of the fisheries and, a true addiction to their resources. Under this scheme, the last thing that matters is the state of the oceans and the species that inhabit them.

I do not overstate when I say that without these resources, fisheries would be totally inviable. In reality, these schemes are financing the destruction of the world's oceans, and in the short term, they foster the impoverishment of many local fishermen and their families.

These incentives —which create fake realities— are being studied worldwide, and in recent years have unleashed international trends to discuss their elimination.

On the other hand, fishing subsidies are not only decimating marine resources, but also creating huge gaps between rich and poor countries and industrial and traditional fishing. Just a handful benefit indefinitely from such subsidies, while others watch how the marine resources whose livelihood depends on get ransacked.

If we focus on the Sea of Cortez case, we see that subsidies benefit directly a small group of fishing companies that extract sardine and shrimp. We are talking about extremely harmful fisheries for the ecosystem which, without the subsidies, would simply not exist.

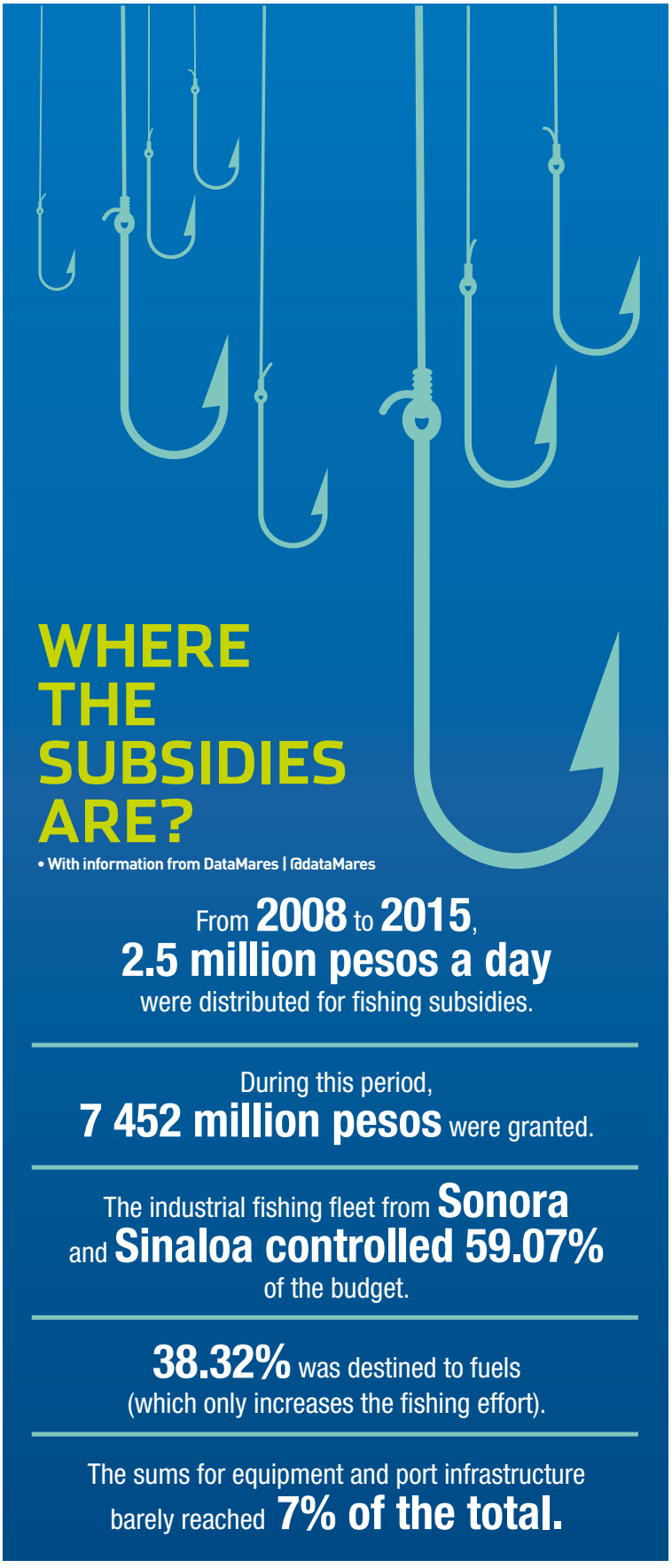
Access to these resources comes from lobbying efforts and political pressure, to which smaller or less connected groups have no access to. These sideline groups are the ones which receive the greatest blow from artificially inflated fisheries.

In 2017 the World Trade Organization, in its ministerial meeting in Buenos Aires, defined a roadmap to end the subsidies which have negative effects and cause overfishing in the oceans. Negotiations require more attention and greater interest, but at least we are on the right track.

Mexico is one of the countries which grants more subsidies and, according to national organizations, these subsidies are mainly for big industrial fishing companies, in detriment of small communities. In a nutshell, subsidies to big companies only increase the gap between industrial fishermen and traditional fishermen.

If we were to change these subsidies, it would be important to redirect them to support communities in the design and implementation of management plans and the creation of fishing refuges, as well as decreeing protected marine areas. These instruments will allow the recovery of the resources and will create reconversion opportunities for those who wish to generate other development schemes.

In any case, regardless of the success in the WTO negotiations, it is urgent to stop these incentives which only deteriorate the health of the oceans, which give us life.



The sardine paradox

WHERE DO THE TONS OF SARDINE FISHED IN MEXICO END UP?

Over 80% of the sardine captured in Mexican seas has as final destination the production of fish flour which mainly used to feed birds, pigs, other fish and even pets. All this in the context of a country with serious nutritional problems and great demand for high quality, low cost foods, like sardine.

During the 1940's, the sardine fishery of the Pacific Coast in the United States experienced a severe crisis. As a result, Mexico acquired part of the fishing fleet and deployed it in Ensenada, operating between this port and Isla Cedros (both in Baja California Sur).

This is how the fishing for the small pelagic fish —sardine— started in our country, and has not stopped since then in the western Pacific coast. In time, sardine fishing moved to the Sea of Cortez (Sonora) as well.

RECAP

According to data from CONAPESCA, sardine capture showed a positive trend from 1940

THE SARDINE FISHERY IS SHARED WITH THE UNITED STATES AND CANADA; HOWEVER, BOTH COUNTRIES STOPPED EXPLOITING IT SINCE 2015, CONSIDERING THE DECIMATION OF ITS BIOMASS AND UNCERTAINTY ABOUT ITS VIABILITY.

up until 2014. The importance of sardine production as part of the national fishing production is fundamental, there is no other fishing resource in our country which accounts for such biomass and, is as exploited as sardine: between 40 and 48% of the total fishing production comes from this species.

From 1950 to 1982, sardine capture recorded a steady growth and for the first time it hit 500 000 tons. Further on, between 1983 and 1989, capture remained stable, between 400 000 and 500 000 tons. From 1990 to 1999 a considerable drop began, 1991 being the most representative year of the crisis, when barely 177 934 tons were captured.

At a later stage, from 1992 to 2014, there was a clear recovery. There are records of unprecedented capture, above las 700 000 tons per year.

THE VALUE OF FISH FLOUR

Before we continue, it is important to clarify that sardine captured in Mexican seas is destined to either of these two commercial options:

1. Canning for human consumption (direct and indirect).
2. Reducing for fram animal food production (although there are other uses, such as aquaculture and pet food).

During the first years of capture (40s), 100% of the extracted sardine was canned for human consumption and flour was produced only as a byproduct, which made perfect sense in a country with a growing population. However, from the 70s onwards —as a result of official government policies—, the incentives and support went only to the production of fish flour. Sadly, the canning industry and the opportunity to have an affordable, high quality source of protein became of lesser importance.

This decision, which was more profitable economically speaking, and still is, contributed to the unnecessary price increase in animal protein for a population with urgent nutritional requirements, and which still suffers from health issues derived from malnutrition. This marks a before and after in terms of the final use given to sardine captured in Mexico.

It is important to consider the loss of biomass that results from the flour production process: 1 kilogram of flour requires 6 kilograms of fresh product. As expected, this situation decreases the chances to provide higher food volumes for Mexicans.

Given the circumstances, it is correct to think that shifting the captured volume towards canning would not solve per se the nutritional and obesity problems in our country, but could certainly be part of the solution.

Today, several decades on, up to 82% of the sardine captured in Mexican seas turns into fish flour to feed cattle. To us, it is undoubtedly a decision made with very little social awareness.

It is also fundamental to think about the short- and long-term future of tuna farms as direct competitors within then canning industry. As they increase their production and farming surface, their demand for fresh or frozen sardine will also go up. It is not hard to imagine who will be the most affected as a consequence.

With a population growth as the one we have experienced in our country, we should pay more attention to the production of high-quality foods for us, Mexicans. So, a policy redefinition should encourage funding for new technologies to in increase the consumption per capita of sea products in general.

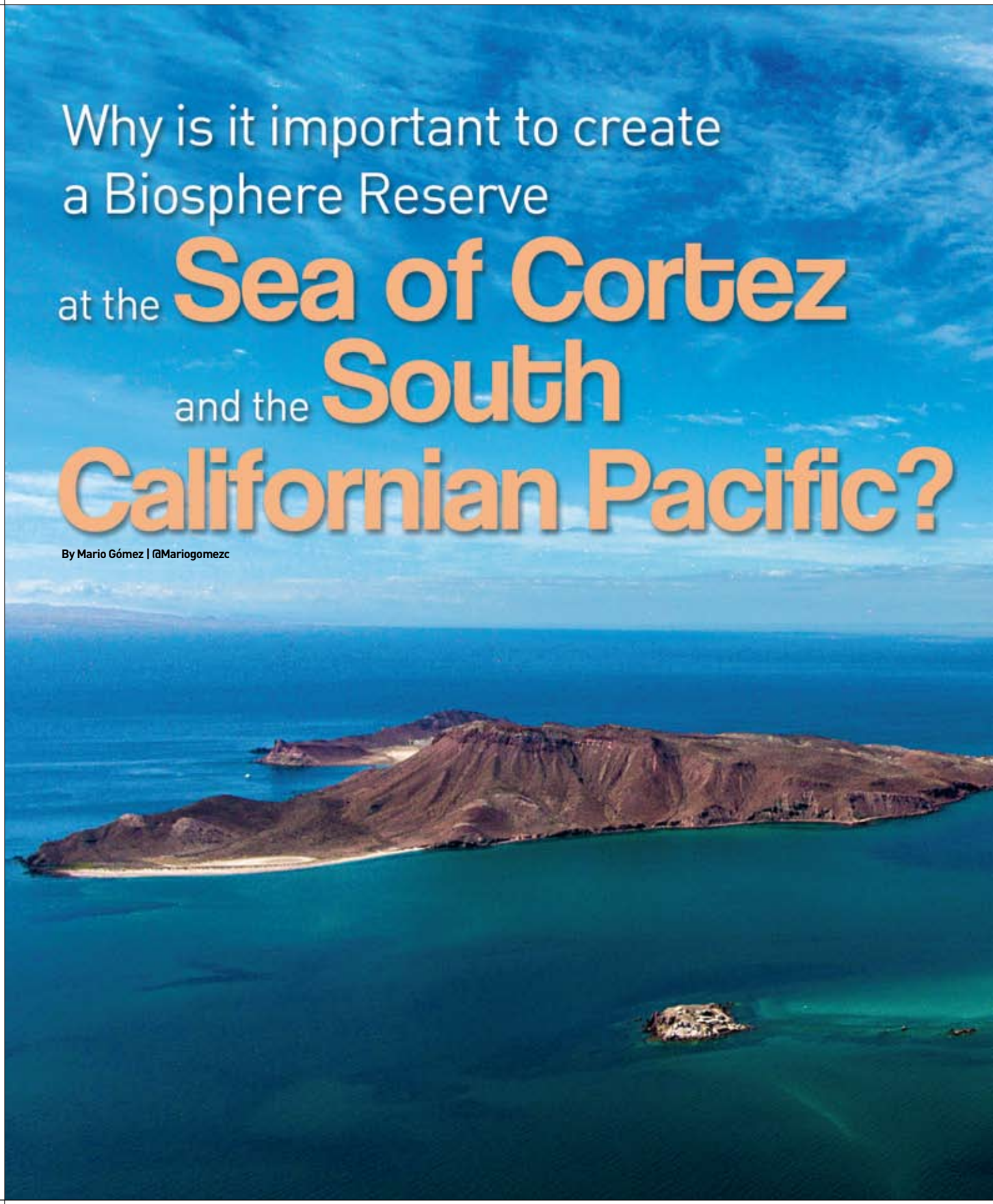
This vision should be implemented gradually to avoid affecting the existing value chain of sardine and other by products, and should be regulated until they reach a stable level.

ECOLOGICAL VALUE

Sardines play a key role in the ecological balance of marine ecosystems as they serve as food for other pelagic species such as carnivore fish, sea lions, dolphins, whales and birds. If there are no sardines in the ocean, these animals will cease to exist too.

Why is it important to create a Biosphere Reserve at the Sea of Cortez and the South Californian Pacific?

By Mario Gómez | @Mariogomezc



The Coalition for the Defense of the Seas (CODEMAR) —of which I am a founding member— recommends the creation of a Protected Marine Area of over 19 million hectares in the in the waters of Baja California Sur; if not done swiftly, the "Aquarium of the World" (as Jacques Cousteau christened it) could potentially turn into a marine graveyard as a result of the devastation caused by the fishing industry.

The Sea of Cortez started attracting the conservationist community in the 70s, when the Alto Golfo de California (between Baja California and Sonora) started facing the imminent extinction of the porpoise, which got trapped in the nets of fishermen searching for totoaba; instead of trying to resolve the problem from the root cause, the focus was put on short-term solutions that of course did not tackle the underlying issues.

Since then, different governments suggested that the answer relied on the creation of Protected Marines Areas (PMAs), but were oblivious to one of the region's key players, the **artisanal fishermen**. By not making them part of the equation, it is now clear why such a bitter issue has not been resolved.

Decades on, we observe how this situation has taken over the entire Sea of Cortez, where most of the fishing gear that has been put in place for the sustainable management of the region has been useless; we are running out of options and before something terrible happens, we are suggesting the creation of a biosphere reserve to regulate the activities in the area and achieve a real sustainability, taking into account the fishing communities which have historic rights over these waters

It is key to realize that the fishing industry in Mexico has always operated at their leisure, leading many species to commercial extinction, to say the least. For example, fishermen from Yucatan and Campeche fish in the waters of Quintana Roo and fishermen from Sinaloa and Sonora operate in Baja California Sur; this situation cannot continue, it is time to grant exclusive rights over their waters to the local fishermen and

empower them to guarantee their livelihoods and make them responsible for the health of the ecosystems.

For the specific case of the Sea of Cortez, it is really worrying to observe how outsiders come to the coasts of Baja California Sur —where there is not an industrial fishing fleet— to fish, and all because they have overexploited their own waters and the abundant life that once existed there no longer does, and it is not profitable to fish there anymore. This is undoubtedly unfair competition because there is nothing a local fisherman can do to stop the huge industrial fishing boats that devastate what little there is left in the area.

One of the main attractions for the fishing industry at the Sea of Cortez is sardine capture; it is shocking to see how this practice is 'certified' as 'sustainable' by the Marine Stewardship Council (international organization), given that this fishery destines 65% of its capture to the production of flours and oils mainly used in aquaculture in Mexico (1 kilogram of flour requires 6 kilograms of fresh sardine). Furthermore, 10% of the capture is frozen and used as bait, and barely 24% of the capture is canned and used for human consumption. It is laughable to think that sardine fishing is considered sustainable.

Even worse, the United States and Canada banned sardine capture since 2015 because of the collapse of its populations, which they share with Mexico as well. And even in the light of this, CONAPESCA is still granting fishing permissions and authorizing its capture.

Based on science, sardine serves as food for other species such as tuna, shark, dolphin, whale, orca, sea lion, birds and all the sportfishing fish like marlin, swordfish and sailfish. This explains why it is no longer possible to observe the abundance of life that Cousteau once saw at the Sea of Cortez.

It is key to confirm that it is totally untrue that the Biosphere Reserve at the Gulf of California, with over 8 million hectares, contemplates a total fishing ban; the protected area CODEMAR is encouraging to protect is only one third of the 24 million hectares the Sea of Cortez covers. Besides, it would only apply to the waters of Baja California Sur which, as I mentioned before, does not have an industrial fishing fleet and fortunately, is still densely populated with various marine species.

Given the above, industrial fishing will not have restrictions in Sonora, Sinaloa or Baja California Norte; industrial fishermen in these three states will be able to continue with their activities in their own waters, where they will have to reorganize their fishing efforts, which implies no job losses, on the contrary, there will be more jobs connected to tourism; this is all about a productive reconversion, as it normally occurs in open and dynamic economies.

The Biosphere Reserve at the Sea of Cortez and the South Californian Pacific is the best option to guarantee our long-term food supply, currently at risk thanks to industrial fishing companies which are decimating the fish populations in the region; fisheries in the area are collapsed, up to 80% in some areas.

FOR THE ARTISANAL FISHERMEN

Those who better look after the sea are those who live by the sea; they know all about fish movements, sea currents, breeding seasons, tides, nutrients, fish populations and fish sizes ... I am taking about the local or traditional fishermen, an almost extinct breed. They are the ones who put food on our table, live with the minimum and are the most affected by a monster whose voracity in insatiable —the fishing industry— which day by day takes more of what used to belong to the local fishermen.

The fishing industry possesses sophisticated vessels which, in a very short time, capture an entire school of any fish, while traditional fishermen use a fishing rod and capture one fish at a time. The former extracts tons of fish, while the latter barely a few selected kilograms.

Local fishermen only capture full grown adult specimens or mature adults of a certain size, while industrial fleets extract everything, including young specimens which have not even reached breeding maturity.

The CODEMAR recommends Baja California Sur to be surrounded by a Biosphere Reserve from the coast and 50 nautical miles (almost 95 kilometers) into the ocean, with an exclusion area for vessels over 10.5 meters long with refrigeration equipment. This reserve also contemplates a buffer zone for local fishermen, where they can carry out their traditional activities as they have done for centuries, in the waters where they were born.

The state of Baja California Sur has as much, or even more, potential in terms of tourism as the Yucatan Peninsula. This is a very interesting challenge for the coming administration of Andrés Manuel López Obrador and his future Secretary of Tourism, Miguel Torruco, as well as for the state governor, Carlos Mendoza Davis: turn this state into a world-class pole of development in terms of conservation tourism. The opportunity is there.

In Mexico exists an ancestral malpractice for fishermen to invade neighboring waters, thinking "before my neighbor takes it all" ... It is instrumental that for the first time in history, the sole users of the waters are the inhabitants of that particular coast.

The Biosphere Reserve at the Sea of Cortez and the South Californian Pacific has its legal foundation on Article 48 of the General Law of Ecological Equilibrium and Environmental Protection, which states that locals should have priority on the surrounding waters over outsiders. This automatically empowers fishermen from Baja California Sur vs. fishermen from Sonora, Sinaloa and Baja California Norte, which are currently the ones who take advantage of these waters without giving anything in exchange to locals from Baja California Sur.

The beneficiaries of these waters should be the local fishermen, who will now have the opportunity to reconvert their productive fishing activities and link them to the thriving tourism industry in the region, while industrial fishing companies will have to start planning where to redirect their fishing efforts, which does not necessarily imply job losses.

It is time to use the region's governance to create wider-scope, assertive instruments for the benefit of local fishermen, beyond the authorities that solely favor the fishing industry, which by the way will now have to reconsider their business strategy.

> IT IS TIME TO GIVE BIRTH TO THE BIOSPHERE RESERVE AT THE SEA OF CORTEZ AND THE SOUTH CALIFORNIAN PACIFIC.

Marine species in a critical situation

By Tom Dillon
Runs the international conservationist effort of The Pew Charitable Trusts.

These are only 15 of the many more marine species that require greater protection on a global scale. The ocean's health is fundamental to preserve life on Earth, therefore, if we unite our strengths to save these creatures —and their habits— we will ultimately be contributing to our own salvation.

For centuries, we took for granted the amazing biodiversity of our planet. However, as environmental threats increase and extinction rates are on the rise, it is time for us to do something to preserve the huge variety of species that accompany us.

Unfortunately, only 3% of the Ocean is totally protected, a very distant figure from the 30% marine scientists recommend and deem necessary to guarantee the viability of all marine ecosystems.

1

ANTARCTIC KRILL *(Euphausia superba).*

This is the beating heart of the Southern Ocean as it feeds numerous species of penguins, seals and whales. Other Antarctic predators such as the leopard seals and orcas feed on animals whose diet is krill based.

2

BIGEYE TUNA *(Thunnus obesus).*

It lives in the warm waters of both the Atlantic and the Pacific oceans. It is a formidable predator, able to swim in deep waters and can weigh up to 200 kilograms. The species is overexploited in the Atlantic, a clear signal that the managers of the fisheries must act immediately to protect it.

BLACK CORAL *(Leiopathes annosa).*

It is considered the oldest living organism in the world (it is approximately 4 265 years old). This species can only be found in the waters surrounding the Hawaiian Islands, at depths between 305 and 488 meters.

BUTTERFLYFISH *(Chaetodon litus).*

Its common name in rapanui language is Tipi tipi'uri and it is one of the 142 species that live exclusively in the waters around Easter Island. The waters surrounding this Chilean territory —so remote and so special— are heavily protected in a marine reserve that only allows island inhabits to continue fishing using ancestral methods.

CASPER OCTOPUS

In 2016 scientists discovered this "ghost" octopus in the Papahānaumokuākea National Marine Monument in Hawaii. This site is one of biggest totally protected marine reserves in the world.

ELEPHANT SEAL *(Mirounga).*

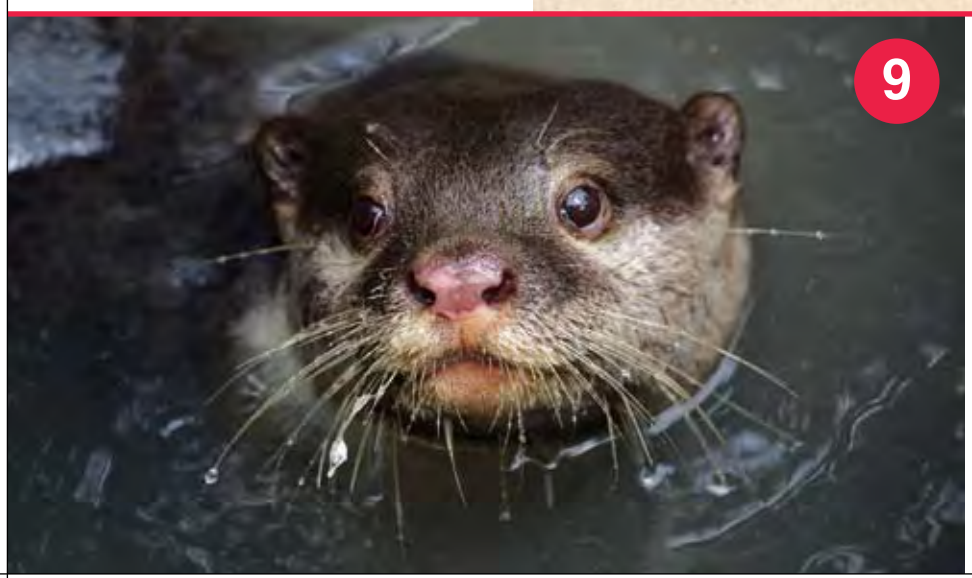
About 54% of all the southern elephant seals inhabit in the South Georgia and Sandwich Islands, 1 700 kilometers off the tip of South America, where the Antarctic and Meridional Oceans join. It is paramount to protect this area as it is a living laboratory to study the effects of climate change: it overflows with life, changes dynamically due to the fast-paced warming of its waters and remains untouched by human activity.

GIANT GALAPAGOS TURTLE *(Chelonoidis spp).*

This turtle species is endangered, it can only be found in the Galapagos Islands, about 1000 kilometers off the coast of Ecuador. Turtles are protected by Ecuadorian law, but illegal fishing of sharks and other regional species has had an effect in the decline in turtle numbers.

MONK HAWAIIAN SEAL *(Neomonachus schauinslandi).*

The Papahānaumokuākea National Marine Monument is a critical habitat for this species, one of the most endangered in the world, according to The Marine Mammal Center. Their main threats are fishing gear left behind, where they get trapped, loss of their natural habitat and human presence in the beaches where they rest, breed and feed.



SEA OTTER *(Lontra felina).*

The loss of key habits for their survival, pollution and poaching are decimating the populations of sea otters, an endangered species that lives off the coasts of Argentina, Chile and Peru. Their habit is entirely marine and they prefer rocky beaches and caverns, as well as seaweed forests, abundant in prey for them.

NAPOLEON FISH
(Cheilinus undulatus).

Known as well as maorí, this reef fish is among the species the IUCN classifies as in danger of extinction, mainly due to overfishing. However, this marine species, —and all the others that inhabit the waters of Palau (insular country in the Pacific)— are under the protection of law that became effective in 2015 and catalogues close to 80% of the waters that serve as its refuge as marine reserves.

BLUEFIN TUNA
(Thunnus orientalis).

This fish can swim at a cruise speed of up to 25 kilometers per hour and migrate great distances, for example, from Japan to the United States and Mexico. It is one of the most endangered species in the world, overfishing has reduced its population by 97% compared to its historic levels.

MAKO SHARK *(Isurus oxyrinchus).*

It has been observed swimming at speeds up to 72 kilometers per hour, a skill that helps it catch its favorite food: tuna. This shark species thrives in mild or cold waters in almost every ocean. It is highly appreciated because of its meat and fins, and it is at risk due to fishing overexploitation.

13

PATAGONIAN TOOTHFISH
(Dissostichus eleginoides).

This species is essential for the food chain in the Antarctic Ocean because it is the main predator in the Eastern Antarctic, a region that has been recommended for marine protected areas since 2011. Scientists know very little about this species: only that it can measure up to 2 meters in length and that it produces anti-freezing proteins to prevent its blood from crystalizing in the low temperatures of the Patagonian and Antarctic seas.

14

WEDDELL SEA
(Leptonychotes weddellii).

Endemic to the Antarctic, it lives further south than any other mammal. This skillful predator can remain underwater for up to one hour, at depths of over 580 meters. Although Weddell seals are protected under the Antarctic Treaty and the Convention for the Conservation of Antarctic Seals, its main food sources —like the Patagonian toothfish and krill— become scarcer by the day due to industrial fishing.

15

WHALE SHARK
(Rhincodon typus).

Because of its 10-ton weight and over 12 meters length, it is the biggest fish in the ocean. These placid giants travel through warm and tropical waters and are considered a top priority for the Convention for the Conservation of Wild Migratory Animals. In 2017, the signing parts agreed to completely ban the capture of this endangered species.

WHAT ARE FISHING REFUGES?

Fishing overexploitation is putting at risk the future of our oceans. If the trend continues, by 2050 most of the species we eat today will have disappeared. Figures speak for themselves: the FAO claims that three out of four species with commercial value are affected by overfishing, while 25% of the total capture is thrown overboard because they are not commercial species.

Mexico is also facing this problem. Our country occupies the 16th place in fishing production on a global scale with 1.7 million tons; however, according to a report from the Environmental Defense Fund Mexico, 30% of the commercial species suffer from overfishing, while the remaining 70% are in a critical state. The organization fears that in 20 years' time we will fish only half of what we do today and earnings will decrease by 97%.

In the light of this panorama, what can be done? On the one hand, experts suggest the development of sustainable fishing schemes; on the other hand, they recommend the creation of areas with temporary fishing bans. This means creating Fishing Refuge Zones where species can breed and increase their populations and reach larger sizes while the ecosystem recovers from the fishing effects.

Mexico already has zones of this kind. The first ones were established in 2012 in the Sea of Cortez, Baja California Sur. They are located along the corridor that goes from San Cosme to Punta Coyote, and these are the result of the joined efforts between the government, civil organizations and fishermen who decided to act to protect their patrimony.

Five years after their establishment, results are now showing: half of the species of interest have augmented both in size and weight.

But recovery is a slow process. For example, grouper populations require up to 20 years to increase their populations, nevertheless, the first step has been taken and the opportunity to have more fish in the sea and at our table is there.

WHAT SEAFOOD TO EAT AND HOW TO DO IT?

By Manuel Fernández Gómez

BY 2050 WE WILL BE OVER 9 500 MILLION PEOPLE IN OUR PLANET AND THE FOOD DEMAND WILL INCREASE BY 70%. THE SOLUTION TO FEED THE GROWING POPULATION MIGHT BE IN THE OCEANS.

Our food choices have a tremendous effect on the health of our marine ecosystems. You decide whether this effect is positive or negative.

1. AWARENESS

Before eating fish or shellfish, you must consider that:

a) It is wildlife that has been extracted from its natural habitat. This biomass is not infinite and plays a fundamental role in preserving the oceans' balance.

b) Fisheries are much more than just geographical regions, fishing methods or marine species. They are places where human activities are connected to marine ecosystems and renewable resources.

2. INFORMATION

You must gather as much information as you possibly can about the species you are about to eat: How was it captured? Where was it captured? What species is it? With this information, you will be able to make better choices and differentiate among species whose populations have been overexploited.

3. DECISION

Apart from the best known and most commercial species —also the most exploited ones, choose between other less valued options in the market. This way you will contribute to avoid waste and encourage seasonal consumption.

4. VALUE

Choose those species whose growth rate is speedy, offspring numerous and recovery rates high. These species are generally located at the bottom of the food chain.

A clear example of this is sardine, that when fished with traditional methods and used for human consumption, the fisherman's work increases its value because the extracted specimen is of higher quality, less marine life was captured and the final consumer is willing to pay an overprice.

Sadly, the latter rarely occurs because sardines are mostly captured by industrial fishing boats that process them for making flours. This causes that thousands of tons extracted from the ocean are poorly paid to the fishermen.

Another example is crab, when it is going through its molting process and it is known as "soft crab". This specimen has very high reproduction rates, its capture involves entire families and communities and it is good because there is no waste, the whole shellfish can be consumed.

5. CONSIDERATIONS

Do not eat predators that are at the top of the food chain and are seriously endangered, they have slow growth rates and very limited offspring, like the shark.

Avoid species that have a high market demand, like tuna.

Respect those species that are on temporary or permanent closed seasons. For example, the Caribbean conch, which is on a strict closed season and its populations are in a critical state in our country.

Consider that there are marlin, swordfish and sailfish species in our country that are reserved solely for sportfishing. Think about this if you see any of these in a restaurant's menu.

6. BENEFITS

By respecting the food chain and adding value to the work of fishing communities (that have lived on fishing for generations) you are encouraging small scale fishermen to fish responsibly, just as they were taught by their ancestors.

BUENA PESCA

For more information: @buena_pesca

RAYS ARE BACK

The reasons for their return are unknown, as is the length of their stay... What is certain is that giant sting rays have returned to the Sea of Cortez, specifically to an area known as La Reina, north of Cerralvo Island, in Baja California Sur. The last time sightings were recorded was between 2002 and 2003 (although there are some records from 2016), and despite not knowing for sure what caused their sudden withdrawal, we are now facing a unique opportunity. It is time to join efforts to develop and implement responsible practices for scuba diving, snorkeling and anchoring. Furthermore, it is key to make fishermen aware of the importance of protecting this species and the ecosystem it inhabits.

WE WANT THEM TO STAY. WE WANT TO PROTECT THEM.

WELCOME TO THE SEA OF CORTEZ!

Information and images from ECO: Ecosystems and Conservation, run by Jenny Rodríguez and Arturo Ayala Bocos.

ECO: Ecosistemas y Conservación

Espíritu Santo, Sea of Cortez (Baja California Sur). I Photo: Mario Gómez.

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